NANOTECH FRANCE 2015

International Nanotechnology Conference
15 – 17 June 2015

Pôle Universitaire Léonard de Vinci, La Défense
Paris – France

Organizer

SETCOR Conferences & Events

www.sector.org

In Collaboration with

NanoSciences ILE-DE-FRANCE
www.CnanoIDF.org

nanomedicine
EUROPEAN TECHNOLOGY PLATFORM
www.etp-nanomedicine.eu

NanoSaclay

SFNano
Société Française de Nanomédecine
French Society for Nanomedicine

IOP Publishing

cnrs

cea

Nanotech France 2015 Conference Program

Day 1 : June 15, 2015		
07:30 - 10:00	Registration + Welcome Coffee	Registration / Main Hall
10:00 - 12:30	Plenary Talks Session **Chairs:** Prof Corinne Chanéac, France and Prof. Dafiné Ravelosona - France	Amphitheatre H
12:30 - 14:00	Lunch Break + Exhibition + Poster Session I	Restaurant / Main Hall
14:00 - 16:00	Session I: Nanomaterials Fabrication/ Synthesis **Chairs:** Prof. Taeghwan Hyeon - Rep. of Korea and Prof Corinne Chanéac - France	Room 511
	Session II - A: Nanomaterials Characterization and Tools **Chairs:** Prof Christophe Petit - France and Dr Nicolas Tsapis- France	Room 508
	Session II - B: Nanomaterials properties **Chairs :** Dr Denis Morineau - France and Prof. Katsuyoshi Kondoh- Japan	Room 561
	Session II - C: Nanomaterials synthesis and properties **Chairs:** Dr Dafiné Ravelosona – France and Prof James Johnston- New Zealand	Room 412/413
16:00 - 16:30	Coffee Break + Exhibition + Poster Session I	Main Hall
16:30 - 18:45	Session I: Nanomaterials Fabrication / Synthesis **Chairs:** Prof Corinne Chaneac – France	Room 511
	Session II - A: Nanomaterials Characterization and Tools **Chairs:** Prof Christophe Petit - France and Dr Nicolas Tsapis- France	Room 508
	Session II - B: Nanomaterials Properties **Chairs** : Dr Denis Morineau - France and Prof. Katsuyoshi Kondoh - Japan	Room 561
	Session II - C: Nanomaterials Synthesis and Properties **Chairs:** Dr Dafiné Ravelosona – France and Prof James Johnston - New Zealand	Room 412/413

Day 2 : June 16, 2015		
08:30 - 10:30	Plenary Talks session **Chairs:** Prof. Nathalie Mignet – France, Prof Steve Rannard – United Kingdom and Prof Patrick Boisseau-France	Amphitheatre H
10:30 - 11:00	Coffee Break + Exhibition + Poster Session II	Main Hall
11:00 - 12:30	Session III: Nano Electronics **Chairs :** Dr Dafiné Ravelosona - France and Prof Jean-Luc Duvail - France	Room 412/413
	Session IV - A: Nanotech in Life Sciences & Medicine **Chairs:** Prof Nathalie Mignet – France, Prof Steve Rannard - United Kingdom and Prof Allan S. Hoffman USA	Room 511
	Session IV - B: Nanotech in Life Sciences & Medicine **Chairs:** Prof Frederic Chaubet, France and Dr Maria-Antonietta Buccheri - Italy	Room 508
	Session IV - C: Nanotech in Life Sciences & Medicine **Chairs :** Prof Patrick Boisseau - France and Prof Magnus Nyden - Australia	Room 561
	Nano MatEn 2015: Nanotech for Energy & Environment **Chairs:** Prof Roger Newman – Canada, Dr Sofoklis Makridis – Greece and Prof James Hill- Australia	Room 115/116
12:30 - 14:00	Lunch break + Exhibition + Poster session II	Restaurant / Main Hall
14:00 - 16:00	Session III: Nano Electronics **Chairs :** Prof Christos Christides – Greece, Prof Dao-Hua Zhang-Singapore and Prof James Johnston- New Zealand	Room 412/413
	Session IV - A: Nanotech in Life Sciences & Medicine **Chairs:** Prof Laurence Rozes – France, Prof Nathalie Mignet – France and Dr Alexandra Wittmar - Germany	Room 511
	Session IV - B: Nanotech in Life Sciences & Medicine **Chairs:** Prof Frederic Chaubet - France, Dr Maria-Antonietta Buccheri - Italy and Prof Vladimir Torchilin - USA	Room 508
	Session IV - C: Nanotech in Life Sciences & Medicine **Chairs :** Prof Patrick Boisseau - France and Prof Magnus Nyden - Australia	Room 561
	Workshop: Towards Horizon 2020 Call Priorities & Funding for Micro / Nano-Enabling Technologies	Room 115/116
16:00 - 16:30	Coffee break + Exhibition + Poster session II	Main Hall
16:30 - 18:45	Session III: Nano Electronics **Chairs :** Prof Christos Christides – Greece, Prof Dao-Hua Zhang-Singapore and Prof James Johnston- New Zealand	Room 412/413
	Session IV - A: Nanotech in Life Sciences and Medicine **Chairs:** Prof Laurence Rozes- France, Prof Nathalie Mignet- France and Dr Alexandra Wittmar - Germany	Room 511
	Session IV - B: Nanotech in Life Sciences and Medicine **Chairs:** Prof Frederic Chaubet - France, Dr Maria-Antonietta Buccheri- Italy and Prof Vladimir Torchilin, USA	Room 508
	Session IV - C: Nanotech in Life Sciences and Medicine	Room 561

	Chairs : Prof Steve Rannard - United Kingdom and Prof Magnus Nyden - Australia	
	Workshop: Towards Horizon 2020 Call Priorities & Funding for Micro / Nano-Enabling Technologies	Room 115/116

Day 3 : June 17, 2015		
08:30 - 10:30	Session IV - D: Nanotech in Life Sciences and Medicine / Nanosafety **Chairs:** Prof Karen Martinez- Denmark / Prof Hyunjoon Kong -USA	Room 511
	Nano MatEn 2015 : Nanotech for Energy and Environment **Chairs:** Prof Rajan Jose – Malaysia, Dr Sofoklis Makridis – Greece and Prof Guosheng Shao – United Kingdom	Room 412/413
	Session V: Other Nanoapplications **Chairs:** Prof Thierry Bastogne – France, Prof. Nathalie Mignet - France and Prof Raman Singh - Australia	Room 508
10:30 - 11:00	Coffee Break + Exhibition	Main Hall
10:30 - 13:00	Brokerage session / B to B Meetings	Main Hall
11:00 - 12:30	Session IV - D: Nanotech in Life Sciences and Medicine / Nanosafety **Chairs:** Prof Karen Martinez - Denmark and Prof Hyunjoon Kong - USA	Room 511
	Nano MatEn 2015 : Nanotech for Energy and Environment **Chairs:** Prof Rajan Jose – Malaysia, Dr Sofoklis Makridis – Greece and Prof Guosheng Shao - United Kingdom	Room 412/413
	Session V: Other Nanoapplications **Chairs:** Prof Thierry Bastogne - France, Prof. Nathalie Mignet - France and Prof Raman Singh - Australia	Room 508
11:30 - 14:00	Networking Cocktail + Closing Ceremony	Main Hall

15 June 2015
Advanced Nanomaterials: Synthesis / Fabrication, Characterization and Tools

Amphitheatre H

Session Chairs: Prof. Corinne Chanéac - France and Prof. Dafiné Ravelosona

07:30-10:00	**Registration + Welcome Coffee**	
10:00-10:40	New frontiers in the science of nanostructured materials for information technology **A. Fert**	**Prof. Albert Fert** (2007 Nobel Prize Physics), CNRS/Thales (UMR137) - **France**
10:40-11:20	State-of-the-Art in Metal Matrix Composites Reinforced with Carbon Nanotubes by Powder Metallurgy Process **K. Kondoh**	**Prof. Katsuyoshi Kondoh,** Osaka University **- Japan**
11:20-12:00	Designed Chemical Synthesis and Assembly of Uniform-sized Nanoparticles for Medical and Energy Applications **T.Hyeon**	**Prof. Taeghwan Hyeon**, Seoul National University - **Republic of Korea**
12:00-12:30	Nanomaterials for Biomedical and Green Chemistry Applications **J.Y. Ying**	**Prof. Jackie Y. Ying,** Institute of Bioengineering & Nanotechnology - **Singapore**
12:30-14:00	**Lunch Break + Exhibition + Posters session I**	

15 June 2015
Session I: Nanomaterials Fabrication / Synthesis

Room 511

Session Chairs : Prof. Taeghwan Hyeon - Rep. of Korea and Prof Corinne Chaneac - France

14:00-14:15	Hyperbranched-Polydendrons: A New Materials Platform for Advanced Polymer Technologies F L. Hatton, H. Rogers, A. Dwyer, L. M. Tatham, L. R. Tidbury, P. Chambon, A.Owen and **S. P. Rannard**	**Prof Steve Rannard**, University of Liverpool - **United Kingdom**
14:15-14:30	New geometric model for carbon nanocones incorporating curvature B.J. Cox and **J.M. Hill**	**Prof James M. Hill**, University of Adelaide - **Australia**
14:30-14:45	New Synthesis of Cobalt Nanoparticles with Tunable Size in Ionic Liquids **B. Morcos**, P.H. Haumesser and C.C. Santini	**Dr Bishoy Morcos**, CEA, LETI, Minatec Campus, Grenoble - **France.**
14:45-15:00	Intense visible emission from ZnO nanoparticles synthesized via co-precipitation and hydrolysis methods **Y. Zhu**, A. Apostoluk, B. Masenelli, P. Gautier, A. Valette and S. Danielle	**Ms Yao Zhu**, Institut national des sciences appliquées de Lyon – **France**
15:00-15:15	Influence of Processing Parameters on the Structure of Porous Metal Oxide-Cellulose Nanocomposites Prepared by Non-Solvent Induced Phase Separation **A. Wittmar** and M.Ulbricht	**Dr Alexandra Wittmar**, University Duisburg-Essen - **Germany**
15:15-15:30	Ultra-fast and controlled synthesis of Au-Iron Oxide hybrid nanocomposites using microfluidics **A.Larrea**, V.Sebastian, M. Arruebo and J.Santamaria	**Ms Ane Larrea**, University of Zaragoza – **Spain**
15:30-15:45	Atmospheric Pressure Plasma for Nanomaterials : Production of Tailored Metal, Oxide and Polymer coated nanoparticles by Discharge Filaments in Dielectric Barrier Discharges **J-P. Borra**, N. Jidenko, J. Hou and A. Weber	**Dr Jean-Pascal Borra**, CNRS-Paris-Sud University - **France**
15:45-16:00	Nanolithography using thermal scanning probes **S.M. Weber**	**Dr Stefan Weber**, SwissLitho AG - **Switzerland**
16:00-16:30	**Coffee Break + Exhibition + Poster session I**	

Session Chair: Prof Corinne Chaneac – France

16:30-16:45	A novel method for the preparation of poly(aminoacid) capped ultrasmall gold nanoclusters **I. Guryanov**, F. Polo, S. Antonello, F. Maran, E. V. Ubyivovk, E. Vlakh and T. Tennikova	**Dr Ivan Guryanov**, St.-Petersburg State University - **Russia**
16:45-17:00	First-principles calculations of two BN plus two C stripes BxCyNz selected nanotubes E. Ribas, M. J. Piotrowski, A. C. M Carvalho and **M. Machado**	**Dr Marcelo Machado**, Universidade Federal de Pelotas – **Brazil**
17:00-17:15	Control of inter (bi)metallic nanoparticular distances **F. Kameche**, A. Six, A.-T. Ngo, D. Kreher, F. Mathevet, A-J Attias, C. Salzemann, F. Charra and C. Petit	**Mr Farid Kameche**, 1 Sorbonne Universités, UPMC Univ Paris 06/ UMR 8233 - **France**
17:15-17:30	One pot microwave assisted synthesis of bisphosphonate alkene capped gold nanoparticles **R. Aufaure**, Y. Lalatonne, N. Lièvre, O. Heintz, L. Motte and E. Guénin	**Mr Romain Aufaure**, University Paris 13 - **France**
17:30-17:45	Electrodeposition of Gold Dendrites in the Presence of Aminosilane on FTO glass and Their Applications **N.Y .Hau** and S. P. Feng	**Ms Nga Yu Hau**, University of Hong Kong - **Hong Kong**

17:45-18:00	Novel Nano Rods of N-nicotinyl,N′,N″-bis(hexamethylenyl) Phosphorictriamide **N. Oroujzadeh**	**Dr Nasrin Oroujzadeh**, Iranian Research Organization for Science and Technology (IROST) - **Iran**
18:00-18:15	Cross-linked PAN-based thin-film composite membranes for non-aqueous nanofiltration **L. Pérez-Manríquez**, J. Aburabi'e, P. Neelakanda and K-V. Peinemann	**Ms Liliana Pérez-Manríquez**, King Abdullah University of Science and Technology (KAUST) -Thuwal - **Kingkom of Saudi Arabia**
18:15-18:30	Materials aspects of AlSi foams and AlSi + SiC composite foams joining **J. Nowacki**	**Prof Jerzy Nowacki**, West Pomeranian University of Technology- **Poland**
18:30-18:45	Nanofunctionalization of alginate and alginate/GelMA crosslinked hydrogels by nanoliposomes and 3D construct **R. Kadri**, B. Aliakbarian, L. Sanchez-Gonzalez, A. Tamayol, A.H. Najafabadi, A. Khademhosseini and E. Arab-Tehrany	**Ms Rana Kadri**, Lorraine University- **France**

15 June 2015
Session II - A: Nanomaterials Characterization and Tools
Room 508
Session Chairs: Prof Christophe Petit - France and Dr Nicolas Tsapis- France

14:00-14:15	Simultaneous Topography and Electrochemical Imaging (SECM) **G. Kada**, S. Wu and C. Kranz	**Dr Gerald Kada**, Keysight Technologies GmbH - **Austria**
14:15-14:30	Copper nanoparticles: organization and stability **K. Ouadahi** and A. Courty	**Mrs Karima Ouadahi**, Pierre et Marie Curie University - **France**
14:30-14:45	Improved spectral imaging ellipsometry for nanoscale solid-liquid interface investigations **P. De Beule**	**Dr Pieter De Beule**, International Iberian Nanotechnology Laboratory, Braga - **Portugal**
14:45-15:00	Quantitative ellipsometric measurements of single micro-objects **D. Lyutov**, S. Hadjiiski, G. Tsutsumanova, S. Russev	**Mr Dimitar Lyutov**, University of Sofia – **Bulgaria**
15:00-15:15	blueDrive™ photothermal excitation for fast, reliable and quantitative AFM **A. Labuda**, J. P. Cleveland, N. Geisse, S. Hohlbauch, M. Kocun, R. Proksch, I. Revenko, M. Viani, D.A. Walters.	**Mr Julien Lopez**, Asylum Research, an Oxford Instruments Company, California - **USA**
15:15-15:30	On-chip characterization and sorting of engineered nanomaterial surface properties by real-time affinity monitoring **C. Desmet**, A. Valsesia, S. Muldur, V. Spampinato, G. Ceccone, P. Colpo and F. Rossi	**Dr Cloe Desmet**, European Commission Joint Research Centre, Institute for Health and Consumer Protection, Ispra - **Italy**
15:30-15:45	HPLC Optimization for Clotrimazole Assay in Microemulsion and Microemulsion-Based Gel **P. Boonme**, J. Kaewbanjong,T. Amnuaikit and E.B. Souto	**Dr Prapaporn Boonme**, Prince of Songkla University, Songkhla – **Thailand**
15:45-16:00	Structural characterization of DPPC nanosized liposomes by optical and cryoelectron microscopy: interactions with bovine serum albumin R. **Rachana**, J. Bellare and R. Banerjee	**Dr Rachana R**, JayPee Institute of Information Technology - **India**
16:00-16:30	**Coffee Break + Exhibition+ Poster Session I**	

Session Chairs: Prof Christophe Petit - France and Dr Nicolas Tsapis- France

16:30-16:45	Nanometer scale characterizations of InGaN nanorods grown on GaN template **Y. El Gmili**, S. Sundaram, R. Puybaret, X. Li, P. L. Bonanno, C. Pradalier, P. L. Voss, J.P. Salvestrini and A. Ougazzaden	**Dr Youssef El Gmili**, UMI GeorgiaTech, CNRS2958 - **France**
16:45-17:00	Picodiagnostics of Nanomaterials Local Atomic Structure: X-Ray Absorption Spectroscopy and Computer Modeling Synergy **A. Soldatov**, A. Kravtsova, K. Lomachenko, M. Soldatov, A. Bugaev and O. Polozhentsev	**Prof Alexander Soldatov**, Southern Federal University of Russia - **Russian Federation**
17:00-17:15	Optical and Structural Characterizations of Phase Transition in Nanoscale Peroskite CH3NH3PbI3 **H. Wu**, W. Kong and Z. Ye	**Prof Huizhen Wu**, Zhejiang University - **China**
17:15-17:30	An Investigation of Sb2Te and Ge2Sb2Te5 Phase Change Memory Film Properties Deposited by Pulsed Laser Deposi-tion **S. E. Khansari** and M. Hoffman	**Mrs Sayedeh Emami Khansari**, University of New South Wales, Sydney - **Australia**
17:30-17:45	Advanced Transmission Electron Microscopy of Epitaxial-Enabled Morphology Controling ITO NWs **O.I. Lebedev**, S. Turner, Y. Shen and T. Wu	**Dr Oleg Lebedev**, CRISMAT Laboratory/UMR 6508/ CNRS ENSICAEN - **France**
17:45-18:00	Dynamic Characteristics of Carbon Nanotube Based Nano-composites with Atomic Vacancy and Stone-Wales Defects S.O. Gajbhiye and **S. P. Singh**	**Prof Satinder Paul Singh**, Indian Institute of Technology Delhi - **India**
18:00-18:15	Multi-scale characterization of chitosan-nanoemulsion blended film **R.R.A. Soares**, E.A. Tehrany, K. Delion, M. Guillemin, N.E. Amrani and W. Xu	**Mrs Raquel Soares**, ENSAIA, University of Lorraine - **France**

15 June 2015 Session II - B: Nanomaterials properties		
Room 561		
Session Chairs: Dr. Denis Morineau - France and Prof. Katsuyoshi Kondoh - Japan		
14:00-14:15	Identification of Ductility Function in Titanium Nitride Nanocoating Deposited on Polycarbonate-urethane of Ventricular Assist Device **A. Milenin**, M. Kopernik and S. Kąc	**Prof Andrij Milenin**, AGH University of Science and Technology - **Poland**
14:15-14:30	Diffusion of Proteins Through and Across Polyelectrolyte Multilayers **S.Pahal**, M.Varma and A.M.Raichur	**Mrs Suman Pahal**, Indian Institue of Science - **India**
14:30-14:45	Synthesis and Characterisation of Conjugated Polymer Nanoparticles for Fluorescence Imaging Applications **G. Redmond**	**Prof Gareth Redmond**, University College Dublin - **Ireland**
14:45-15:00	The Role of DC and PRC Current Densities on the Sliding Wear of Electrodeposited Nickel-Cobalt /CNT Composite Coatings R. Karslioglu and **H. Akbulut**	**Prof Hatem Akbulut**, Sakarya University - **Turkey**
15:00-15:15	Widely and Rapidly Switchable Wettability Through Short-Range Ordered-Disordered Transition and Redox Reaction **Y-H. Chang** and S-P. Feng	**Mrs Ya-Huei Chang**, University of Hong Kong - **Hong Kong**
15:15-15:30	Critical overview of polymer self-assemblies formation and characterization M. Dionzou, **C. Roux**, U. Till, B. Lonetti, J.-D. Marty, A.-F. Mingotaud, C. Mingotaud, P. Joseph, D. Goudounèche, B. Payré and M. Léonetti	**Dr Clément Roux**, Toulouse Unversity - **France**
15:45-16:00	Prediction of photothermal phase signatures from arbitrary plasmonic nanoparticles and experimental verification **O. Blum** and N.T. Shaked	**Mr Omry Blum**, Tel Aviv University - **Israel**
16:00-16:30	**Coffee Break + Exhibition + Poster Session I**	
Session Chairs: Dr. Denis Morineau - France and Prof. Katsuyoshi Kondoh - Japan		
16:30-16:45	In-Situ Thermally-reduced Graphene Oxide/Epoxy Composites: Thermal and Mechanical Properties **G. B. Olowojoba**, A. C. Taylor and A. J. Kinloch	**Dr Ganiu Olowojoba**, Imperial College London - **United Kingdom**
16:45-17:00	Tribological Behaviors of Yttria-Stabilized Zirconia (YSZ) Nanoparticles as Lubricant Additives **A. Sert** and D. Yılmaz Çakta	**Mr Abdullah Sert**, Eskisehir Osmangazi University - **Turkey**
17:00-17:15	Calcium phosphate super-balls synthesized in presence of gelatin and chitosan **J. Koetz** and I. Kovach	**Prof Joachim Koetz**, Potsdam University - **Germany**
17:15-17:30	NanoBuilding Blocks based-Hybrid organic-inorganic copolymers with Self-Healing Properties **L. Rozes**, F. Potier, A. Guinault, S. Delalande, C. Sanchez and F. Ribot	**Prof Laurence Rozes,** Sorbonne University, UPMC Univ Paris 06 /Collège de France/CNRS UMR 7574 - **France**.
17:30-17:45	Hybrid gold nanoparticles modified by oligopeptides for lead (II) ions interaction monitoring **J. Politi**, J. Spadavecchia, M. Iodice and L. de Stefano	**Dr Jane Politi**, Institute for Microelectronics & Microsystems, Naples, NRC - **Italy**
17:45-18:00	Characterization of Ferromagnetic Metal–Carbon Nanocomposites Prepared by Solid-Phase Pyrolysis of Metal-Phthalocyanines **A. Manukyan**, A. Mirzakhanyan, H. Gyulasaryan, R. Khachaturyan, E. Sharoyan	**Dr Aram Manukyan**, Institute for Physical Research/ NAS of Armenia - **Armenia**
18:00-18:15	Ambient scalable synthesis of surfactant-free thermoelectric metal chalcogenide nanostructures **C. Han**, Z. Li, W.L. Li, L.J. Zhang and S. X. Dou	**Mr Chao Han**, University of Wollongong - **Australia**
18:15-18:30	Effect of Temperature During Composite Materials Synthesis for the use as Gas Separators in Alkaline Water Electrolysers on their Ionic Conductivity and Oxygen Barrier Properties **J. Stojadinović**, G. Kasiribidhendi and F. La Mantia	**Dr Jelena Stojadinovic**, University of Bochum-Bochum - **Germany**
18:30-18:45	Effect of polystyrene nanocomposite prepared via Pickering emulsion polymerization on the mechanical properties of PP and EVA A.B. Moustafa, M.E. Abd El-Aziz, A.M Rabie and **H.A. Essawy**	**Prof Hisham Essawy**, National Research Center, Cairo - **Egypt**.

15 June 2015 Session II - C: Nanomaterials Synthesis and Properties		
Room 412/413		
Session chairs : Dr. Dafiné Ravelosona - France and Prof. James Johnston - New Zealand		
14:00-14:15	Kinetic Study of Functionalization of Carbon Nanomaterials **T.P. Dyachkova**, E.N. Tugolukov, I.V. Anosova and A.G. Tkachev	**Ms Tatyana Dyachkova**, Tambov State Technical University - **Russian Federation**
14:15-14:30	Single and Biphasic TiO2 nanotubes by Electrochemical Anodization **R.Savitha**, K. Nolan, A. Morrissey, R.Ravi Krishna, P.Selvam, R. Chetty	**Mrs Savitha Rangasamy**, Indian Institute of Technology, Madras - **India**.
14:30-14:45	3D Printed Hydrophobic and Antimicrobial Nanofunctionalised Surfaces **M. J. Cook**, L. Gilbertson, J. H. Johnston and T. Miller	**Ms Michelle Cook**, Victoria University of Wellington - **New Zealand**
14:45-15:00	Molecular dynamics simulation of glass formation and crystallization in binary PdNi and CuNi alloys. **M. Faruq**, A. Villesuzanne and G. Shao	**Mr Muhammad Faruq**, University of Bolton - **United Kingdom**
15:00-15:15	Graphene mediated synthesis of gold nanoparticles and its nanocomposite and their Applications P. C. Pandey and **Y. Pandey**	**Mr Yashashwa Pandey**, ,Indian Institute of Technology (BHU) - **India**
15:15-15:30	Preparation, morphological and AC electrical characterization of porous PEG/Polyaniline/Gold Nanowires composite. **M. Celentano**, R. Vecchione and P. A. Netti	**Dr Maurizio Celentano**, Napoli University - **Italy**
15:45-16:00	Low Pressure Chemical Vapor Deposition of Nickel Oxide Nanospheres as Anode for Lithium-ion Battery **L. Meda**, C. Arnold. A, J. He and A. Dangerfield	**Dr Lamartine Meda**, Xavier University of Louisiana - **USA**
16:00-16:30	**Coffee Break + Exhibition+ Poster Session I**	
Session chairs : Dr. Dafiné Ravelosona - France and Prof. James Johnston - New Zealand		
16:30-16:45	Morphology, Properties and Electrocatalytic Behaviour of Nanoporous Metals prepared by Electrolytic Dealloying of AgAuPt Alloys A. Vega and **R.C. Newman**	**Prof Roger Newman**, University of Toronto - **Canada**
16:45-17:00	Modulation of Active Sites in Supported Au38(SC2H4Ph)24 Cluster Catalysts: Effect of Atmosphere and Support Material **B.Zhang**, S.Kaziz, H.Li, M.G.Hevia, D.Wodka, C.Mazet, T.Bürgi and N.Barrabés	**Ms Bei Zhang**, University of Geneva - **Switzerland**
17:00-17:15	Tuning colloidal stability, MRI relaxivity and bioelimination of functional nanoparticles **A. Walter**, A. Garofalo, J. Taleb, P. Bonazza, C. Billotey, S. Laurent, L. Vander Elst, R. N. Muller, D. Felder-Flesch and S Begin-Colin	**Dr Aurelie Walter**, Ecole polytechnique fédérale de Lausanne **- Switzerland**
17:15-17:30	Parametric study on Fiber Bragg Grating for improvement of AE sensitivity **I. Kandas**, N. Shehata, E. Samir and H.A. Khater	**Dr Ishac Kandas**, Alexandria University - **Egypt.**
17:30-17:45	The Power of Heterogeneity: A Systems Approach to Complex Data in Materials Science **M. Nyden**, N, Williamson, M. Röding and T. Nann	**Prof Magnus Nyden**, University of South Australia, Adelaide - **Australia**
17:45-18:00	A facile route to synthesize rutile TiO2 nanorods arrays via hydrothermal method **M. Guo**, Y. Gao, Q. Deng, X. Xia and G. Shao	**Ms Meilan Guo**, University of Bolton - **United Kingdom**
18:00-18:15	The Effect of pH on Expanding Titanate Nanotubes & Their Use as a High Capacity Lithium-Ion Battery Electrode with High Rate Capability **A. Yürüm**, M. Yarali, E. Bicer and S. Alkan Gürsel	**Dr Alp Yurum**, Sabanci University, Istanbul - **Turkey**
18:15-18:30	Preparation of Graphene Encapsulated Silicon Nanoball by CVD using Metal Coating **H. Kim**, S. Park, I. Kang and H. Huh	**Mr Huijin Kim**, Korea Institute of Industrial Technology, Inha University - **Rep. of Korea**

16 June 2015		
Amphitheatre H		
Session Chairs: Prof. Nathalie Mignet - France, Prof. Steve Rannard – United Kingdom and Prof Patrick Boisseau - France		
8:30-9:10	The Early History of Nanocarriers as Drug Delivery Systems **A. S. Hoffman**	**Prof Allan S. Hoffman,** Bioengineering Department, University of Washington - **USA**
9:10-9:50	Nanomedicine for molecular imaging: interest of bimodality in preclinical studies **N. Mignet**	**Dr Nathalie Mignet**, CNRS - UMR8258/ Faculty of Pharmacy Paris- **France**
9:50-10:30	Nanotechnologies for the treatment of severe diseases **P. Couvreur**	**Prof. Patrick Couvreur,** University of Paris-Sud, Institut Galien, **France**
10:30-11:00	**Coffee Break + Exhibition + Poster session II**	

16 June 2015		
Session III: Nano Electronics		
Room 412/413		
Session Chairs: Dr. Dafiné Ravelosona - France and Prof Jean-Luc Duvail - France		
11:00-11:15	Towards a force-displacement sensor based on vertical ZnO piezoelectric nanowires **E. León Pérez**, M. Mouis and E. Pauliac-Vaujour	**Mr Edgar Leon Perez**, CEA, LETI - **France**
11:15-11:30	Transport properties of nanoscale TFET by atomic scale simulations **U. Martinez Pozzoni**, T. Markussen, A. Blom and K. Stokbro	**Dr Umberto Martinez**, QuantumWise A/S - Copenhagen – **Denmark**
11:30-11:45	InAsSb based room temperature Infrared Photodetectors J. Tong, P. Ni and **D-H. Zhang**	**Prof Dao-Hua Zhang**, Nanyang Technological University – **Singapore**
11:45-12:00	Selective preconcentration within a nanoslit: one route for monitoring the biomolecule focusing front line. **F-D. Delapierre**, A-C. Louër, A. Pallandre and A-M Haghiri-Gosnet	**Dr François-Damien Delapierre**, LPN, CNRS, Marcoussis - **France**
12:00-12:15	Controlled Insulator to Metal transition in SiO2 –TiO2 nanocomposite containing silver nanoparticles **T. Das Gupta**, J. Corde, S. Perruchas, J-P. Boilot, A. Charles Rowe and T. Gacoin	**Mr Tapajyoti Das Gupta**, CNRS - Polytechnic School – Palaiseau – **France**
12:15-12:30	Surface-Dominated Transport and Enhanced Thermoelectric Figure of Merit in Topological Insulator Bi1.5Sb0.5Te1.7Se1.3 **T-C.Hsiung** and Y-Y. Chen	**Mr Te-Chih Hsiung,** National Taiwan University - **Taiwan**
12:30-12:45	Side-jump scattering in nanogranular Bi thin films **C. Christides** and P. Athanasopoulos	**Prof Christos Christides**, University of Patras - **Greece**
12:45-13:00	Light emission coupling from Carbon nanotubes in silicon photonic structures **C. Alonso-Ramos**, A. Noury, E. Durán-Valdeiglesias, W. Zhang, F. Sarti, Federico La China, H.C. Hoang, X. Le Roux, H. Yang, E. Cassan, N. Izard, A. Filoramo, V. Bezugly, M. Gurioli, L. Vivien	**Dr. Carlos Alonso- Ramos**, Univ Paris 11, **France**
12:30-14:00	**Lunch Break + Exhibition + Poster session II**	
Session III: Nano Electronics		
Room 412/413		
Session Chairs: Prof Christos Christides – Greece, Prof Dao-Hua Zhang-Singapore and Prof James Johnston- New Zealand		
14:00-14:15	Single-Molecule Switches Trigerred by Light,Chemical and Electrochemical Stimuli **N. Darwish**, A.C. Aragonès, T. Darwish, S. Ciampi and I. Díez-Pérez	**Dr Nadim Darwish**, University of Barcelona – **Spain**
14:15-14:30	Performance study of Phase Change Memory in Different Crossbar Architectures **N.H. El-Hassan**, T. N. Kumar and H. A.F.Almurib	**Ms Nemat H. El-Hassan**, University of Nottingham - **Malaysia.**
14:30-14:45	Synthesis of IV-VI Transition Metal Carbide and Nitride Nanoparticles using a Reactive Mesoporous Template for Electrochemical Hydrogen Evolution **N.S. H. Alhajri**, D.H. Anjum, M. N. Hedhili and K. Takanabe	**Ms Nawal Alhajri**, KAUST - **Kingkom of Saudi Arabia.**
14:45-15:00	Zinc doped InP colloidal quantum dots **N. Mordvinova**, A. Vinokurov, T Kuznetsova, S. Dorofeev and O. Lebedev	**Mrs Natalia Mordvinova**, Lomonosov Moscow State University – **Russia**
15:00-15:15	Micellar and Colloidal Dispersions of Conjugated Polymer Nanoparticles for Photoinduced Electron Transfer Applications **S. Wang** and G. Redmond	**Ms Suxiao Wang** University College Dublin - **Ireland**

15:15-15:30	Coupling between plasmonic response of supported gold particles and changes on TiO2 band gap **S. R. Islas**, R. Zanella and J. M. Saniger	**Ms Selene Islas,** Universidad Nacional Autónoma de México - **Mexico**
15:30-15:45	On Low Temperature Photoluminescence of Zinc-blende CdS and Au-CdS Nanocrystals **S. V. Kahane**, V. Sudarsan and S. Mahamuni	**Ms Shital Kahane**, SP Pune University - **India**
15:45-16:00	Nanoplasmonics in Inorganic Nanoparticles **T. Teranishi**	**Prof Toshiharu Teranishi**, Kyoto University - **Japan**
16:00-16:30	**Coffee Break + Exhibition + Posters session II**	
Session Chairs: Prof Christos Christides – Greece, Prof Dao-Hua Zhang-Singapore and Prof James Johnston- New Zealand		
16:30-16:45	MoS2 Transistors with Electrografted Organic Ultrathin Film as Efficient Gate Dielectric **H. Casademont**, L. Fillaud, X. Lefevre, R. Cornut, B. Jousselme and V. Derycke	**Mr Hugo Casademont**, CEA Saclay, IRAMIS / NIMBE (UMR 3685) / LICSEN - **France**
16:45-17:00	Nanoscale Magnetic Materials and Magnetic Nanodots for Spintronic Applications **S. Ghosh**	**Prof Santanu Ghosh**, Indian Institute of Technology Delhi- **India**
17:00-17:15	Polymer-Based Nanowires and Nanotubes: nanosources, wave-guiding **J.L. Duvail**, A. Garreau, J. Bigeon, N. Huby, B. Bêche, F. Massuyeau, A. Désert, S. Cordier, Y. Molard and E. Faulques	**Prof Jean-Luc Duvail,** University of Nantes - **France**
17:15-17:30	3D Simulation of DG-FinFET transistor with different channel materials and gate dielectrics **N. Boukortt**, B. Hadri, L. Torrisi, S. Patanè, A. Caddemi, and G. Crupi	**Mr Nour El Islam Boukortt**, University of Messina - **Italy**
17:30-17:45	Key Variable Components for Enhancing Charge Transfer at PbS Quantum Dots/Porphyrin Interfaces: From Quantum Confinement to Electrostatic Interaction **A. O. El-Ballouli**, E. Alarousu, O. M. Bakr and O. F. Mohammed	**Mrs Ala'a El-Ballouli**, King Abdullah University of Science and Technology (KAUST), Thuwal, **Kingdom of Saudi Arabia**
17:45-18:00	Room Temperature Synthesis and Characterization of Stable, Highly Luminescent PbS/CdS Core-Shell Quantum Dots with Emission Below 1100 nm **E. Durmusoglu**, P. Dagtepe, Y. Turker and H. Yagci Acar	**Mr Emek Goksu Durmusoglu**, Koc University, Istanbul - **Turkey**
18:00-18:15	PANI deposited carbon cloth as binder-free electrode for symmetric supercapacitor application M.V. Astakhov, R.R. Galimzyanov, A.A. Klimont, I.S. Krechetov, S.V. Stakhanova, O. V. Uryupina and **M. Kundu**	**Dr Manab Kundu**, National University of Science and Technology - **Russia Federation**
18:15-18:30	High performance photoconductive device for UV region fabricated using graphene- n-GaN nanowire hybrid structure on Si substrate S. Kang, **A. Mandal**, J.H. Chu, J-H. Park, S-Y. Kwon and C-R. Lee	**Dr Arjun Mandal**, Chonbuk National University - **Rep. of Korea**
18:30-18:45	Transparent and flexible electrodes based on metallic nanowire networks: New nanomaterials and operating stability. **A. Cabos**, C. Celle, A. Carella and J-P. Simonato	**Mr Anthony Cabos**, CEA-LITEN / DTNM / SEN / LSIN, Grenoble - **France**

16 June 2015 Session IV - A: Nanotech in Life Sciences and Medicine		
Room 511		
Session Chairs: Prof. Nathalie Mignet – France, Prof. Steve Rannard – United Kingdom and Prof. Allan S. Hoffman USA		
11:00-11:15	Emergence of Ag2S Quantum Dots and Their Magnetic Hybrid Structures as New Promising Bionanomaterials **H. Yagci Acar**, I. Hocaoglu, D. Asik, C. Grandfils, I. Ojea-Jimenez and F. Rossi	**Prof Havva Funda Yagci Acar**, Koc University, Istanbul - **Turkey**
11:15-11:30	Stimuli-sensitive combination nanopreparations of siRNA and chemotherapeutic drugs to treat multidrug resistant cancer **V. Torchilin**	**Prof Vladimir Torchilin,** Northeastern University, Boston - **USA**
11:30-11:45	Nanocapsules of perfluorooctyl bromide as theranostic agents: formulation and in vivo evaluation T. Boissenot, B. Larrat, A. Bordat, P. Calleja-Gonzalez, G. Giacalone, L. Mousnier, E. Fattal and **N. Tsapis**	**Dr Nicolas Tsapis**, Univ Paris-Sud, Institut Galien Paris-Sud, UMR CNRS 8612, LabEX LERMIT, Pharmacy Faculty - **France**
11:45-12:00	Formulation and evaluation of Rosuvastatin Calcium-loaded solid lipid nanoparticles **P. Shah**	**Dr Pranav Shah**, Uka Tarsadia University - **India**
12:00-12:15	A blueprint for modified siRNA-cationic peptide dendrimer based therapy of Type 2 diabetes through 'PTPN1' gene silencing **G. Kokil**	**Mr Ganesh Kokil**, The University of Queensland - **Australia**
12:15-12:30	Instability of Carbon Nanoparticles Interacting with Lipid Bilayers **D. Baowan**	**Dr Duangkamon Baowan**, Mahidol University, Bangkok - **Thailand**
12:30-14:00	**Lunch Break + Exhibition + Poster session II**	

16 June 2015 Session IV- A: Nanotech in Life Sciences and Medicine		
Room 511		
Session Chairs: Prof Laurence Rozes – France, Prof Nathalie Mignet – France and Dr Alexandra Wittmar - Germany		
14:00-14:15	Targeting of asymmetric amino acid-based cationic dendrimers to caveolae **P. Rewatkar**, H. S. Parekh and M. Parat	**Ms Prarthana Rewatkar**, Univ. of Queensland - **Australia**
14:15-14:30	Polymeric self-assemblies for photodynamic therapy: a critical approach U. Till, L. Gibot, B. Moukarzel, **A.F. Mingotaud**, M.P. Rols, M. Gaucher, F. Violleau, C. Chassenieux and P. Vicendo	**Dr Anne-Françoise Mingotaud**, IMRCP, Univ. Paul Sabatier, Toulouse - **France**
14:30-14:45	Biodegradable Nanoconstructs for Pharmacology: Development of Biomimetic Systems for Drug Delivery and Pathogen Blockage **T. Tennikova**, V. Korzhikov, I. Guryanov, V. Sharoyko and E. Vlakh	**Prof Tatiana Tennikova**, Saint-Petersburg State University, **Russian Federation**
14:45-15:00	Evaluation of Gelled Oil Nanoparticles as New Vehicles for Drug Delivery **B. Martin**, F. Brouillet, S. Franceschi-Messant and E. Perez	**Mr Baptiste Martin**, Toulouse University III- **France**
15:00-15:15	Bio-inspired catanionic vesicles as drug delivery systems: Study of the cell internalisation pathways P. Castagnos, C. Mauroy, J. Teissié, I. Rico-Lattes, A. C. Tedesco, M. P. Rols and **M. Blanzat**	**Dr Muriel Blanzat**, Paul Sabatier University, Toulouse - **France**
15:15-15:30	Novel Nano-Carriers for Controlled Pulmonary Drug Delivery **I. M. El-Sherbiny** and H. D. C. Smyth	**Prof Ibrahim El-Sherbiny**, Zewail City of Science and Technology - **Egypt**
15:30-15:45	Effect of Nanotube Materials on Encapsulation of Lysozyme **N. Thamwattana**	**Prof Ngamta Thamwattana**, University of Wollongong - **Australia**
15:45-16:00	Structure-directing star-shaped block copolymers: Supra-molecular vesicles for the delivery of anticancer drugs **C. Yang**, S. Qiong Liu, S. Venkataraman, S.J.Gao, X.T. Chia, J.L. Hedrick and Y.Y.Yang	**Dr Chuan Yang**, Institute of Bioengineering and Nanotechnology - **Singapore**
16:00-16:30	**Coffee Break + Exhibition + Posters session II**	
Session Chairs: Prof Laurence Rozes – France, Prof Nathalie Mignet – France and Dr Alexandra Wittmar - Germany		
16:30-16:45	Tunable release of dendritic fullerene-1 modulated by an electric field across a nanochannel membrane **G. Bruno, T. Geninatti**, R. L. Hood, D. Fine, G. Scorrano, J. Schmulen, S. Hosali, M. Ferrari and A. Grattoni	**Mr Giacomo Bruno**, Houston Methodist Research Institute - **USA**
16:45-17:00	Preparation of Hydrolysable Biocompatible Polymersomes for Drug Delivery **A.Azran-Gefen** and H.Bianco-Peled	**Mrs Gefen-Azran Adi**, Technion-Israel Institute of Technology - **Israel**.
17:00-17:15	Enhanced permeability througth the blood-brain barrier us-ing targeted solid lipid nanoparticles for brain drug delivery	**Ms Joana F. Queiroz**, University of Porto - **Portugal**

	J.F. Queiroz, A.R. Neves, S.A. Costa Lima and S. Reis	
17:15-17:30	Design of Magnetic Molecularly Imprinted Polymer for Controlled Release of Doxorubicin under Alternative Magnetic Field. **N. Griffete**, J. Fresnais, A. Bée and C. Ménager	**Dr Nebewia Griffete**, Pierre et Marie Curie University - **France**
17:30-17:45	BioConjugated Gold Nanoparticles for Enhaced Delivery and Cellular Uptakes **K. Rahme**, J. Guo, C. M. O'Driscoll and J. D. Holmes	**Dr Kamil Rahme**, Notre Dame University - **Lebanon**
17:45-18:00	Prednisolone-loaded pH-sensitive liposomes as an active targeting strategy for rheumatoid arthritis **V.M. Gouveia,** S. Lima, C. Nunes and S. Reis	**Ms Virgínia M. Gouveia**, University of Porto - **Portugal**
18:00-18:15	Rapid nanoformulation and cGMP preparation of antiretroviral drugs for oral HIV nanomedicine and human clinical dosing studies **M. Giardiello**, T. O. McDonald, P. Martin, N. Liptrott, M. Siccardi, A. Owen and S. Rannard	**Dr Marco Giardiello**, University of Liverpool - **United Kingdom**
18:15-18:30	Combined PTT & PDT cancer therapies mediated by hybrid carbon nanotubes and assessment of ultrasound elastography for monitoring tumor treatment **I Marangon**, A Andriola Silva, C Menard-Moyon, G Renault, N Luciani, A Bianco and F Gazeau	**Ms Iris Marangon**, Paris Diderot University - **France**

16 June 2015		
Session IV - B: Nanotech in Life Sciences and Medicine		
Room 508		
Session Chairs: Prof. Frederic Chaubet - France and Dr. Maria - Antonietta Buccheri - Italy		
11:00-11:15	Penetration of mucoadhesive chitosan-dextran sulfate nanoparticles into the cornea **W. Chaiyasan**, W. Tiyaboonchai, S.P. Srinivas, S. Praputbut and U. Kompella	**Ms Wanachat Chaiyasan**, Naresuan University - **Thailand**
11:15-11:30	Magnetic nanoprobes with anti-HER2 single chain antibody fragments for active targeting of breast and ovarian cancers **C. Alric**, K. Hervé Aubert, N. Aubrey, E. Allard-Vannier, A. Di Tommaso, I. Dimier-Poisson and I. Chourpa	**Dr Christophe Alric**, University of Tours - **France**
11:30-11:45	Cellulose Nanocapsules of Metoprolol and its Metabolites Produced as New Products in Pharmaceuticals Recycling Processes **G.D. Souza**, D.H.E. Schiavon, C.B. Pelizaro and G.B. Teixeira	**Dr Gezimar Souza**, Accert Chemistry and Biotechnology.Inc - **Brazil**
11:45-12:00	Ph/temperature and Magnetic Field Responsive Doxorubicin Loaded NIPA Coated Superparamagnetic Nanoparticles for Targeted Cancer Therapy **R. Khodadust**, Y. Yar and H. Yagci	**Dr Rouhollah Khodadust**, Koc University - **Turkey**
12:00-12:15	Targeted polyethylene glycol gold nanoparticles for the treatment of pancreatic cancer: from synthesis to a proof-of-concept in vitro studies **J. Spadavecchia**, D. Movia, H. Moustaoui ,C. Moore, C.M. Maguire, S. Casale and A. Prina-Mello	**Dr Jolanda Spadavecchia**, Pierre et Marie Curie University/ CNRS - **France**
12:15-12:30	Oral insulin delivery and biodistribution of biopolymers-based nanoparticles **M.A. Lopes**, D.Aniceto, R. Seiça, F. Veiga and A.J. Ribeiro	**Ms Marlene A. Lopes**, Faculty of Pharmacy of University of Coimbra - **Portugal**
12:30-14:00	**Lunch Break + Exhibition + Poster session II**	

Session IV-B: Nanotech in Life Sciences and Medicine		
Room 508		
Session Chairs: Prof Frederic Chaubet - France, Dr Maria-Antonietta Buccheri - Italy and Prof Vladimir Torchilin, USA		
14:00-14:15	IONCs: a versatile tool for hyperthermia, imaging and controlled drug delivery **M.E. Materia**, P. Guardia, H. Kakwere, A. Sathya, M. Pernia, S. Nitti, G. Pugliese, L. Manna and T. Pellegrino	**Dr Maria Elena Materia,** Fondazione Istituto Italiano di Tecnologia - **Italy**
14:15-14:30	A Novel Wound Dressing Coated with Self-Assembling Peptide Nanofibrils as a Drug Carrier **R. Alazragi** and A. Aggeli	**Mrs Reem Alazragi**, University of Leeds - **United Kingdom**
14:30-14:45	Core-cone Structured Monodispersed Mesoporous Silica Manoparticles with Ultra-large Cavity for Protein Delivery **C. Xu**	**Mr Chun Xu**, University of Queensland - **Australia**
14:45-15:00	Impact of the Polyethylenimine Conjugation Mode on the Cell Transfection Efficiency of Silica Nanovectors **X. Wang**, S. Masse, G. Laurent, C. Hélary and T. Coradin	**Ms Xiaolin Wang**, Pierre et Marie Curie University - **France**
15:00-15:15	PEI – Starch Nanoparticles for siRNA based Gene Silencing Therapy for Cancer **B.B. Kandemir**, B. Özpolat, G.T. Köse and V. Hasırcı	**Ms Berke Bilgenur Kandemir**, Middle East Technical University, Ankara -**Turkey**
15:15-15:30	Synthesis of l-PEI and 2MPA Coated Biocompatible Silver Sulfide QDs as Transfection Vectors	**Ms Didar Asik**, Koc University-Istanbul - **Turkey**

	D. Asik ,F. Demir and H.Y. Acar	
15:30-15:45	The Role of Triblock Amphiphilic Copolymers for DNA Translocation Through Lipid Bilayers B. Rasolonjatovo, **C.Huin**, B.Pitard, J.Mathé, V.Bennevault-Celton, T.Le Gall, T.Montier, P.Lehn, H.Chéradame and P.Guégan	**Dr Cecile Huin**, University of Evry - **France**
15:45-16:00	Synthesis and Characterization of Folate-Targeted Poly(ethylene glycol) Coated Cationic Ag2S QDs for Tumor Targeted Gene Delivery **F. Demir,** R. Khodadust, D. Asik and H. Yagci Acar	**Mrs Fatma Demir Duman**, Koc University, Istanbul- **Turkey**
16:00-16:30	**Coffee Break + Exhibition + Posters session II**	
Session Chairs: Prof Frederic Chaubet - France, Dr Maria-Antonietta Buccheri - Italy and Prof Vladimir Torchilin - USA		
16:30-16:45	A Systemic Approach For Manipulating Geometries Of Nano Gold And Nano Silver in Synthesis for Controlling Vector Borne Diseases **S. Prakash**	**Prof Soam Prakash**, Dayalbagh Educational Institute, Dayalbagh - **India**
16:45-17:00	Influence of TiO2 and Al2O3 Addition on Mechanical Properties of Dental Zirconia **O. Agac**, A. Ozturk and J. Park	**Ms Ozlem Agac**, ATILIM University, Ankara - **Turkey**
17:00-17:15	Piezoresistive Strain Sensing Characteristics of Nano-carbon Composites G. R. Choi, H. K. Park, H. Huh, K. T. Lim, B. K. Choi, S. Y. Kim and **I. Kang**	**Prof Inpil Kang**, National University Busan - **Republic of Korea**
17:15-17:30	Plasmonic nanoparticle interaction with cell for photoacoustic cancer imaging **M. Ishihara**, T. Hirasawa, R. Sato and T. Teranishi	**Prof Miya Ishihara**, National Defense Medical College, Tokorozawa - **Japan**
17:30-17:45	Novel hybrid nanoparticles using upconversion luminescence for in vivo imaging **N. Francolon**, F. Leccia, E. Jouberton, D. Boyer, I. Miladi, Delphine Felder-Flesch, Sylvie Begin-Colin, L. Morel, E. Miot-Noirault, J-M. Chezal and R.Mahiou	**Ms Nadege Francolon**, Chemistry Institute of Clermont Ferrand - **France**
17:45-18:00	Efficient and Spatial-Selection Delivery of Quantum Dots in Live Cells by Gold Nanoparticle Medicated Photoporation **R. Xiong**, J. Demeestera, S. C. De Smedta and K. Braeckmans	**Mr Ranhua Xiong**, Ghent University - **Belgium**.
18:00-18:15	Nanoparticles functionalized with an antibody: toward an specific contrast agent of brain tumors by MRI **S. Richard**, M. Boucher, A. Herbet, Y. Lalatonne, S. Mériaux, D. Boquet and L. Motte	**Ms Sophie Richard**, CSPBAT /UMR CNRS 7244, Université Paris 13 University - **France**
18:15-18:30	Specificity and Sensitivity comparative study between phage PVP-S1 and monoclonal antibody as receptor in polydiacetylene vesicles for Salmonella colorimetric detection **T.V. de Oliveira**, N. de F.F.Soares, C.M. Carvalho, J. S. dos R. Coimbra, N. J. de Andrade, J. Azeredo, E. A. A. Medeiros and P. P. Freitas	**Dr Taíla Oliveira**, Federal University of Viçosa - **Brazil**
18:30-18:45	Nanoarchitectonics with Lipid and DNA Building Blocks: In situ Millisecond Time-Resolved SAXS Investigation B. Angelov, **A. Angelova**, M. Drechsler and S. Lesieur	**Dr Angelina Angelova**, CNRS UMR8612 Galien Institute- Paris Sud University- **France**

16 June 2015		
Session IV-C: Nanotech in Life Sciences and Medicine		
Room 561		
Session Chairs: Prof. Patrick Boisseau - France and Prof. Magnus Nyden - Australia		
11:00-11:15	A New Generation of Flower-Like Nanobiocatalyst for Superior Enzymatic Activity **I. Ocsoy**, N, Özdemir and B. Somturk	**Dr Ismail Ocsoy** Erciyes University - **Turkey**
11:15-11:30	Porous nanoparticles entrapped pipette tips for sensitive detection of bio-molecules **C. Lei**	**Ms Chang Lei,** University of Queensland - **Australia**
11:30-11:45	Ultrasensitive magnetic particles/DNAzymes based biosensors for clinical applications. **S. Persano**, G. Vecchio, P. Valentini and P.P.Pompa	**Mr Stefano Persano**, Istituto Italiano di Tecnologia - **Italy**.
11:45-12:00	Immobilization of pyranose 2---oxidase onto functionalized electrospun regenerated cellulose ultrafine fibers: anovel heterogeneous catalyst **W. Panatdasirisuk**, T. Vongsetskul, J. Sucharitakul, P. Chaiyen and P. Tangboriboonrat	**Ms Weerapha Panatdasirisuk**, Mahidol University, Bangkok - **Thailand**
12:00-12:15	Ultra-sensitive Silicon Nanowires for hormone detection **R. S. Forsyth**, R. M. Bigham, M. A. Mohd Azmi, Z. Tehrani, K. A. D. Walker and O. J. Guy.	**Ms Rhiannan Forsyth**, Swansea University - **United Kingdom**
12:15-12:30	Blocking Viral DNA Replication by Employing a Resonance Frequency Generated by Ag4O4 — A Real World Solution. **L. Mack**	**Dr Leigh Mack**, CIMTESES Foundation - **USA**
12:30-12:45	Synthesis and cytocompatability of functionalized multiwalled carbon nanotubes derivatives **A.A. Haroun**	**Prof Ahmed A. Haroun**, National Research Center, Cairo - **Egypt**

12:30-14:00	Lunch Break + Exhibition+ Poster session II	

Session IV - C: Nanotech in Life Sciences and Medicine		
Room 561		
Session Chairs: Prof Patrick Boisseau - France and Prof Magnus Nyden - Australia		
14:00-14:15	Development of high sensitive devices using optical tweezers and diamond nanocrystals **J.R. Maze**, N. Figueroa, R. Gonzalez, N. Casanova,V. Waselowski, F. Sazunic, A. Chandía, F. Morales, L. Martinez, C. Wilson, A. Álvarez and M. Kogan	**Prof Jeronimo Maze**, Pontificia universidad Catolica - **Chile**
14:15-14:30	Versatile and easy to fabricate advanced surfaces to enhance the performance of DNA microarray detection **M.J. Bañuls**, D. González-Lucas, R. Puchades and A. Maquieira	**Dr Maria-Jose Bañuls** Politechnic University Valencia - **Spain**
14:30-14:45	DNA detection using Si-nanosandwich **A. Chernev**, N. Bagraev, L. Klyachkin, A. Emelyanov and M. Dubina	**Mr Andrew Chernev**, St. Petersburg Academic University - **Russia**
14:45-15:00	DNA Sensing at femtomolar level using microfluidic electro-chemical cell: advantages of carbon-based transducers B. Zribi, H. Korri-Youssoufi, A. Ouerghi, A. Cavanna, A. Madouri and **A-M Haghiri-Gosnet**	**Dr Anne-Marie Haghiri-Gosnet**, LPN / CNRS- Marcoussis - **France**
15:00-15:15	Selection of peptide motifs for the detection of small molecules in biotechnological applications **C. Di Natale,** C. Cosenza, P.L. Scognamiglio, E.Battista, F. Causa and P.A.Netti	**Ms Concetta Di Natale**, University of Naples - **Italy**.
15:15-15:30	Covalent functionalization of SWNT with ciprofloxacin for enhancing its antibacterial activity **M. Assali**, F.Abdallah, R. Khayyat and A.N. Zaid	**Dr Mohyeddin Assali**, An Najah National University - **Palestine**
15:30-15:45	High-aspect ratio nanostructures for cellular applications N. Buch-Månson, S. Bonde, K.R. Rostgaard, J. Bolinsson, J. Nygård and **K.L. Martinez**	**Prof Karen Martinez**, University of Copenhagen - **Denmark**
15:45-16:00	A Development of Microstrip Patch Antenna with Graphene and Titanium Dioxide For Orthopaedic Implants **N. Fugto**, S. Chaisiri, R. Kaewon and S. Sirivisoot	**Mr Nateetorn Fugto**, King Mongkut's University of Technology Thonburi - **Thailand**
16:00-16:30	**Coffee Break + Exhibition+ Posters session II**	
Session Chairs: Prof Steve Rannard - United Kingdom and Prof Magnus Nyden - Australia		
16:30-16:45	Nanoscale Modification of Natural Cell-derived Matrices for Tissue Engineering Applications **M.P. Hwang**, R. Subbiah and K. Park	**Mr Mintai Hwang**, Korea Institute of Science and Technology, Seoul – **Rep. of Korea**
16:45-17:00	Modular Assembly Gadolinium-Coated Nanoliposomes Enabling Detection of Ischemic Vasculature C. Smith, S. Zimmerman, Sanjay Misra and **H. Kong**	**Prof Hyunjoon Kong**, University of Illinois at Urbana-Champaign - **USA**
17:00-17:15	Pluronic F127 coated superparamagnetic nanoparticles for Human Umbilical Vein Endothelial Cell tracking via magnetic resonance imaging **B. Argibay**, R. Iglesias, M. Pérez-Mato,T. Sobrino, A. Beiras, J. Rivas, U. Himmelreich, J. Castillo, F. Campos	**Mrs Barbara Argibay Gonzalez,** Health Research Institute of Santiago de Compostela (IDIS), University Clinical Hospital Hospital **- Spain**
17:15-17:30	Preparation, Biological Activity and Mechanism of Action of Ag and AgBr Nanoparticles **P. Suchomel**, L. Kvitek, A. Panacek, R. Prucek, J. Hrbac, R. Vecerova and R. Zboril	**Mr Petr Suchomel**, Palacky University, Olomouc - **Czech Republic**
17:30-17:45	Preparation of Novel Selenium Nanoparticles with Strong In Vitro and In Vivo Anti-cancer Efficacy Using Tiger Milk Mushroom **K-H. Wong**	**Dr Ka-Hing Wong**, The Hong Kong Polytechnic University - **Hong Kong**
17:45-18:00	Conductive polypyrrole: a promising interface for attachment and proliferation of mammalian cells A.E. Fernández-Duke, B.E. Millán-Chiu, C. Arenas-Arrocena and **L.M. López-Marín**	**Dr Luz M. López-Marín**, Universidad Nacional Autonoma de Mexico - **Mexico**
18:00-18:15	An In Vitro Study of Osteoblast Behaviors on Graphene Oxide Electrodeposited on Anodized Titanium **P. Tanurat** and S. Sirivisoot	**Ms Pacharaporn Tanurat**, King Mongkut's University of Technology Thonburi - **Thailand**
18:15-18:30	STM Imaging of Yellow Fluorescent Protein under Ambient Condition **H.M.Yusoff**, I.I. Rzeznicka, H. Hoshi, S. Kajimoto, N.N. Horimoto, K.Sogawa and H. Fukumura	**Dr Hanis Mohd Yusoff**, Malaysia Terengganu University - **Malaysia**.

16 June 2015 NanoMatEn2015 : Nanotech for Energy and Environment		
Room 115/116		
Session Chairs : Prof Roger Newman - Canada, Dr Sofoklis Makridis - Greece and Prof James Hill - Australia		
11:00-11:15	Nanoparticles-based Plasmonic Organic Photovoltaic Devices for Enhanced Performance and Stability G. Kakavelakis, M. Krassas, M.M. Stylianakis, N. Vaenas, K. Savva, E. Stratakis and **E. Kymakis**	**Prof Emmanuel Kymakis**, Technological Education-al Institute (TEI) of Crete - **Greece**
11:00-11:30	Effect of halide-mixing on the electronic transmission in organometallic perovskites **G. Berdiyorov**, M. El-Amine Madjet, Fedwa El-Mellouhi, F. H. Alharbi and S. Kais	**Dr Golibjon Berdiyorov**, Qatar Environment and Energy Research Institute - Qatar Foundation - **Qatar**
11:00-11:45	One-pot Fabrication of Nb-doped TiO2 Photoanode for Dye-sensitized Solar Cells **Y-T. Huang**, Y-H. Chang, P. Zhai, N.Y. Hau and S-P. Feng	**Ms Yu Ting Huang**, University of Hong Kong - **Hong Kong**
11:45-12:00	Highly stable carbon nanofluids for solar thermal collectors **S. Mesgari**, N. Hjerrild and R. A. Taylor	**Dr Sara Mesgari Hagh**, University of New South Wales - **Australia**
12:00-12:15	Perovskite Solar Cell Modules built on Vertical TiO2 Nanorods with High Efficiency and Stability A. Fakharuddin, F. Di Giacomo, F. Matteocci, A.L. Palma, I. Ahmed, A. Di Carlo, T.M. Brown and **R. Jose**	**Prof Rajan Jose**, Malaysia Pahang University - **Malaysia**
12:15-12:30	The Development of Alumina Nanofluids-based ferro/ferricyanide Electrolyte and their Applications on Thermogalvanic Cells **C. Liu** and S-P. Feng	**Ms Chang Liu**, University of Hong Kong - **Hong Kong.**
12:30-12:45	Soft, Compressible and Interdigitated 3D Energy Storage Devices Built by Layer-by-Layer Assembly Inside Aerogels **A. Marais**, G. Nyström, E. Karabulut, L. Wågberg, Y.Cui and M. Hamedi	**Mr Andrew Marais**, Royal Institute of Technology KTH - Stockholm - **Sweden**
12:45-13:00	Numerial study of MAXI3 (X=Pb, Sn) perovskite based hetero-junction solar cells M. Guo and **G. Shao**	**Prof Guosheng Shao**, University of Bolton - **United Kingdom**
12:30-14:00	**Lunch Break + Exhibition + Poster session II**	

14:00-18:00	**Workshop:** **Towards Horizon 2020 call priorities & funding for Micro/Nano-enabling Technologies**
Room 115/116	

Speakers and Moderators:

- **Susan ANSON** (Karlruher Institut für Technologie, **Germany**)
- **Adrien BRUNET** (Karlruher Institut für Technologie, **Germany**)
- **Jérôme GAVILLET** (Commissariat à l'Energie Atomique et aux Energies Renouvelables, **France**)
- **Helmut LOIBL** (Fotec, **Austria**)
- **Lionel TENCHINE** (Pôle Européen de Plasturgie, **France**)
- **Todor Stefanov PETROV** (University of Birmingham, **United Kingdom**)

Welcome and Introduction about the 4M2020 initiative	**14:00 - 14:30**
4M2020 outline and intermediate results	**14:00 - 14:15**
Key Enabling Technologies (KETs) in advanced manufacturing - Nanotechnologies	**14:15 - 14:30**
Workshop Introduction and Sessions	**14:30 – 17 :45** **Including 30 mins coffee break**
Session 1 - Review and ranking of topics and products of high impacts for EU	
Session 2 - Key technologies and value chains	
Session 3 - Technical and non-technical bottlenecks	
Debriefing, Conclusion and Next Steps	**17:45 - 18:00**
Networking Cocktail	**18:00 - 19:30**

17 June 2015 Session IV-D: Nanotech in Life Sciences and Medicine / Nanosafety		
Room 511		
Session chairs: Prof Karen Martinez- Denmark / Prof Hyunjoon Kong-USA		
08:30-09:15	Nano- and Microfabricated Hydrogels for Regenerative Engineering **Ali Khademhosseini**	**Prof. Ali Khademhosseini**, Harvard-MIT's Division of Health Sciences and Technology (HST) / Brigham and Women's Hospital / Harvard Medical School - **USA**
09:15-09:30	SEEC Microscopy : An innovative optical technique for the live and label-free study of a enzymatic reaction in liquid A.Egea, **N.Médard**, M.Métivier and C.Vieu	**Dr Nicolas Médard**, Nanolane-Le Mans - **France**
09:30-09:45	Fe3-δO4 nanoparticles inhibit Clostridium difficile spore germination: an in vitro and in vivo study W-T. Lee, S-R. Wu, Y-N. Wu, Y-H. Chen, C-S. Yeh, P-J. Tsai and **D-B. Shieh**	**Prof Dar-Bin Shieh**, National Cheng Kung University - **Taiwan**
09:45-10:00	Biocompatibility of nano-vesicles derived from microbial cells: an assessment towards vaccine applications **B.E. Millán-Chiu**, A.O. Tinoco-Martínez, V.D. Compeán-García and L.M. López-Marín	**Dr Blanca.E. Millán-Chiu,** Universidad Nacional Autonoma de Mexico - **Mexico**
10:00-10:15	Identification of critical Monte Carlo simulation parameters in nanoparticles radiosensitization P. Retif, **T. Bastogne** and M. Barberi-Heyob	**Prof Thierry Bastogne**, University of Lorraine - **France**.
10:15-10:30	The spread of multi-wall carbon nanotubes to the room air as a result of their mixing in the fume hood E. Jankowska, T. Jankowski, W. Zatorski and P. Sobiech	**Dr Elzbieta Jankowska**, Central Institute for Labour Protection - **Poland**
10:30-11:00	**Coffee Break + Exhibition**	
11:00-11:15	The DaNa2.0 Knowledge Base Nanomaterials quality-approved and easy-to-understand information on current nanosafety research **C. Marquardt**, H.F. Krug, D. Kuehnel, F. Paul, C. Steinbach and K. Nau	**Dr Clarissa Marquardt**, Karlsruhe Institute of Technology (KIT) - **Germany**
11:15-11:30	In vitro study of lung surfactant-nanoparticle interactions for evaluating nanotoxicity **P. Lai**, W. Daear, M. Anikovskiy, R. Loebenberg and E.J. Prenner	**Mr Patrick Lai,** University of Calgary - **Canada**
11:30-11:45	Effect of Gold Nanoparticle Shape of Cellular Uptake and Toxicity **C. Carnovale**, V. Bansal, R. Shukla and G.Bryant	**Mrs Catherine Carnovale**, Royal Melbourne Institute of Technology - **Australia**
11:45-12:00	Genotoxicity and Mutagenicity Screening of Engineered Nanomaterials: **G. Vecchio**, M. Fenech, P.P. Pompa and N. Voelcker	**Dr Giuseppe Vecchio**, stituto Italiano di Tecnologia - **Italy**
12:00-12:15	Impact of ageing and protein remediation in the life-cycle of metal oxide nanoparticles in the organism **J. Volatron**, F. Carn, M. Hemadi, Y. Javed, D. Alloyeau and F. Gazeau	**Ms Jeanne Volatron**, Paris Diderot Universuty - **France**
12:15-12:30	Size and morphology dependence of gold nanorods and gold nanospheres in the nanotoxicological process: in vitro, in vivo and membrane models studies **J. Cancino**, P.M.P. Lins, V.S. Marangoni, J.C.F. Besson, M.E.C. Cancino, M.R.M. Natali ans V. Zucolotto	**Dr Juliana Cancino-Bernardi**, University of São Paulo - **Brazil**.
11:30-14:00	**Networking cocktail**	

17 June 2015 NanoMatEn2015 : Nanotech for Energy and Environment		
Room 412/413		
Session chairs: Prof Rajan Jose – Malaysia, Dr Sofoklis Makridis- Greece and Prof Guosheng Shao – United Kingdom		
8:30-8:45	Stability of organic solar cells using composites materials of inorganic nanostructures and polymers for efficient organic photovoltaics: time-resolved structural/morphological studies **B. Paci**, A. Generosi, M. Guaragno, V. Rossi Albertini, E. Stratakis and E. Kymakis	**Dr Barbara Paci,** ISM-CNR - **Italy**
8:45-9:00	Understanding Lithium solvation in ionic liquids from first principles molecular dynamics simulations **A. Kachmar** and M. Carignano	**Dr Ali Kachmar**, Qatar Environment and Energy Research Institute- Qatar Foundation - **Qatar**
9:00-9:15	Nanomaterials Impacts Across the Life Cycle: Case Study LCA on Organic Photovoltaic Solar Cells M. Tsang, G. Sonnemann, D. Bassani and **P. Garrigues**	**Mr Philippe Garrigues**, University of Bordeaux-CNRS - **France**
9:15-9:30	Sol-gel complex synthesis of biphasic anatase-brookite photocatalysts for hydrogen production **J. Drbohlavova**, V. Kasparek, K. Castkova, M. Kralova and J. Cihlar	**Dr Jana Drbohlavova**, Brno University of Technology - **Czech Republic**
9:30-9:45	Oxygen Electroreduction on Platinum Nanoparticles Deposited on D-glucose Derived Carbon **M. Taleb**	**Mr Masoud Taleb**, Tallinn University of Technology - **Estonia**
9:45-10:00	Fabrication of heterostructure between Tin oxides and TiO2 nanobelts for application in photocatalysis and gas sensing H. Liu and **G. Chen**	**Mr Guohui Chen**, Shandong University- **China**
10:00-10:15	Efficient and Stable Photo electrochemical Water-oxidation Performance of ZnO NRs with Ultrathin Cobalt Layer **N.K. Reddy**, S. Wahl, P. Bogdanoff and N. Pinna	**Dr Nandanapalli Koteeswara Reddy**, Humboldt University - **Germany**
10:15-10:30	New sensor for direct detection of pesticides in water by Raman spectroscopy coupled with enzymatic functionalized nanoparticles. **A. El Alami**, F. Lagarde, B. Mimouna and P. Daniel	**Ms Amal ALAMI**, Maine University, Le Mans - **France**
10:30-11:00	**Coffee Break + Exhibition**	
11:00-11:15	Graphene Coating and Nanocrystalline Alloy Structure: Novel Approaches for Remarkable Corrosion Resistance **R.K. Singh Raman**	**Prof Raman Singh**, Monash University - **Australia**
11:15-11:30	Characterization and application of multicomponent nanoparticles in the immobilization of heavy metals from water and liquid and solid mining tailings **L. Cumbal**, C. Bastidas and D. Delgado	**Prof Luis Cumbal**, Universidad de las Fuerzas Armadas - **Ecuador**
11:30-11:45	Characterization of Nanosized Metallic Sulfide Catalysts Obtained by Thermal Decomposition of Nanoemulsions **A.M. Quesada Perez**, S. Omani, A. Katrib and A. Bumajdad	**Dr Andres M. Quesada Perez**, Kuwait Institute for Scientific Research - **Kuwait.**
11:45-12:00	Surface Functionalization of TiO2 Nanoparticle and its Application for Biodiesel Production from Locally Sourced Used Cooking Oil **J. Gardy**, A. Hassanpour, X. Lai and M. Ahmed	**Mr Jabbar Gardy**, University of Leeds - **United Kingdom.**
12:00-12:15	Photopolymerization of Water-Soluble Acrylic Monomers Induced by PbS and CdS Nanoparticles **Y. Yar**, E. Buz and H. Yagci Acar	**Ms Yasemin Yar**, Koc University-Istanbul - **Turkey**
12:15-12:30	Design and synthesis of copper chalcogenide nanostructures for energy conversion and storage **X. Chen**, C. Han, Z. Li and S. Dou	**Mrs Xinqi Chen**, University of Wollongong- **Australia**
12:30-12:45	Reduced Carrier Recombination in PbS - CuInS2 Quantum Dot Solar Cells Z. Sun, G. Sitbon, T. Pons, A.A. Bakulin and **Z. Chen**	**Dr Zhuoying Chen**, ESPCI-ParisTech/CNRS/UPMC - **France**
11:30-14:00	**Networking Cocktail**	

17 June 2015 Session V: Other Nanoapplications		
Room 508		
Session Chairs: Prof Thierry Bastogne – France, Prof. Nathalie Mignet - France and Prof Raman Singh – Australia		
8:30-9:00	Nanotechnology in Food Packaging Industry: Opportunities and Challenges **V. Teixeira**	**Prof Vasco Teixeira, University of Minho - Portugal**
9:00-9:15	Nanotechnology: Promises and challenges for future **Akbar S. Khan**	**Dr. Akbar S. Khan**, Defense Threat Reduction Agency-Virginia- **USA**
9:15-9:30	Antimicrobial properties of graphene oxide and reduced graphene oxide **M. A. Buccheri**, S. Scalese, D. D'Angelo, F. Spanò, G. Compagnini, G. Rappazzo and V. Privitera	**Dr Maria-Antonietta Buccheri**, Consiglio Nazionale delle Ricerche (CNR) - **Italy**
9:30-9:45	Phosphonium Quat-Modified Nanoclays for In-Situ Polyester Nanocomposite Development: Optimisation of Modification for Particle Performance. **B.J. Naden** and L. Pilon	**Dr Benjamin Naden**, Pera Technology Ltd - **United Kingdom**
9:45-10:00	Efficient Design of Flexible and Low-cost Dual Band RFID inkjet printed antenna using silver nanoparticles ink A.M. Mansour, B.M. Hamza, **N. Shehata** and M. R. M. Rizk	**Dr Nader Shehata**, Alexandria University - **Egypt**
10:00-10:15	0D based resistive switching mechanism M. Paradinas, **Z. Konstantinovic**, S. Valencia, R. Abrudan, A. Pomar, F. Sandiumenge, Ll. Balcells, B. Martinez and C. Ocal	**Dr Zorica Konstantinovic**, Institut de Ciéncia de Materials de Barcelona, CSIC - **Spain**
10:15-10:30	Photocatalytic Silver/Silver Chloride Polymer Nanocomposites **E. W. Tate** and J. H. Johnston	**Mr Eldon Tate**, Victoria University of Wellington - **New Zealand**
10:30-11:00	**Coffee Break + Exhibition**	
11:00-11:15	Ammonia gas sensing properties of ZnO nanowires synthesized by thermal oxidation of Zn film B. Behera and **S. Chandra**	**Prof Sudhir Chandra**,Indian Institute of Technology, Delhi - **India**
11:15-11:30	Long-term corrosion protection by a nanocomposite thin PEA-TiO2-HMDSO coating **L. Ejenstam**, M. Tuominen, J. Pan, A. Swerin and P.M. Claesson	**Mrs Lina Ejenstam**, KTH Royal Institue of Technology - **Sweden**
11:30-11:45	Branched Polymer Nanoreactors for Catalysis by Design **V.O. Rodionov**, K.V. Bukhryakov and C. Mugemana	**Prof Valentin Rodionov**, KAUST, Thuwal, **Kingdom Saudi Arabia**
11:45-12:00	Novel Nanogold Coloured Wool Textiles, Aulana®, for Luxury Markets **J.H. Johnston** and K.A. Lucas	**Prof James Johnston**, Victoria University of Wellington - **New Zealand**
12:00-12:15	Nanotechnology for more Efficient Sustainable Buildings **R.B. Fouaad**	**Mr Ramy Fouaad**, Alexandria University - **Egypt**
12:15-12:30	Dynamic and Static Fluid Loss Characteristics and Rheological Properties of Nano-Based Drilling Fluids **Z. Vryzas**, O. Mahmoud, H. Nasr-El-Din and V. C. Kelessidis	**Mr Zisis Vryzas**, Texas A&M University at Qatar - **Qatar**
12:30-12:45	Surface-Bound Ligands Modulate Chemoselectivity and Activity of a Bimetallic Nanoparticle Catalyst V.O. Rodionov, **K.B. Vu** and K.V. Bukhryakov	**Dr Khanh B. Vu**, KAUST, Thuwal - **Kingdom of Saudi Arabia**
12:45-13:00	Effects of Nanotechnology Materials on Architectural Design- Applications, Possibilities and Future Trends **N.K.Parthenopoulou** and M.Malindretos	**Mrs Nikoleta Parthenopoulou**, Aristotle University of Thessaloniki - **Greece**
13:00-13:15	Synthesis, Characterization and Catalytic Performance of Supported Nickel Nanoparticles in Methane Steam Reforming M.J. Al-Marri, **S. Ali** and M. M. Khader	**Dr Sardar Ali**, Qatar University - **Qatar**
11:30-14:00	**Networking cocktail**	

15 June 2015
Posters Session I - A: Advanced NanoMaterials

N.	Title	Author/Affiliation/Country
1	One-step preparation of amylose and β-carotene nanoparticle inclusion microbeads using amylosucrase from Deinococcus geothermalis **C.A. Letona**, M-C. Lim and Y-R. Kim	**Mr Andres Letona**, Kyung Hee University – **Rep. of Korea**
2	Encapsulation of water molecules in cyclic peptide nanotube **P. Tiangtrong**, N. Thamwattana and D. Baowan	**Ms Prangsai Tiangtrong**, Mahidol University, Bangkok - **Thailand**
3	PDMS Surface Property Study and Sol-gel Modification Methods for the Immobilization of Unstable Enzyme **H. Bi**, A. C. Fernandes, F. Cardoso, M. Brito, S.I. Pinheiro Cardoso and P. Freitas	**Dr Hongyan Bi**, International Iberian Nanotechnology Laboratory - **Portugal**
4	New Methods for Creating Nanocomposites Based on Carbon Nanotubes and Graphene Nanoplatelets **E.A. Burakova**, A.V. Gerasimova, A.V. Melezhyk, A.G. Tkachev	**Dr Elena Burakova**, Tambov State Technical University, Tambov, **Russian Federation**
5	Preparation of Polybutadiene-Silica Nanoparticles via Differential Microemulsion Polymerization and their Hydrogenated Nanoparticles by Diimide Reduction **T. Tancharernrat**, G. L. Rempel and P. Prasassarakich	**Ms Thanyaporn Tancharernrat**, Chulalongkorn University - **Thailand**
6	Construction Copper-Based (I) Superstructures via Recrystallization **Y. Shang**, L. Guo and G. Y. Shang	**Dr Yang Shang**, Beihang University-Beijing - **China**
7	Bio-reduction of Graphene Oxide by Natural Products **E. Ozturk**, S. Şimsek and B. Ozbek	**Ms Elif Ozturk**, Yildiz Technical University - **Turkey**
8	Simple Synthesis of Magnetic Nanoparticles for same shape and size without Size separation **H.Y. Noh**, Y.J. Eom, M. Abbas and C.G. Kim	**Mr Heeyoon Noh**, Daegu Gyungbuk Institute of Science and Technology - **Rep. of Korea**
9	Acid hydrolysis to improve the production of Bacterial Cellulose Nanocrystals P. Paximada, E.A. Dimitrakopoulou, C. Fasseas and **I. Mandala**	**Dr Ioanna Mandala**, Agricultural University of Athens - **Greece**
10	High Pressure Laminates containing Fluorinated Polyhedral Oligomeric Silsesquioxanes **S. Magina**, D. Evtuguin, I. Portugal, J. Ferra and P. Cruz	**Mrs Sandra Magina**, CICECO - University of Aveiro, **Portugal**
11	Green Synthesis of Gold Nanoparticles by Using Peltophorum pterocarpum Flower Extracts M. Balamurugan, S. Kaushik and **S. Saravanan**	**Prof Saravanan Shanmugam**, Sona College of Technology - **India**
12	Stabilization metal nanoparticles by crown compounds with amine and hydroxyl groups in macrocyclic ring and studying their properties A.L.Shabanov, A.M.Maharramov, Z.O.Gakhramanova, M.A.Ramazanov, **U.A.Hasanova**, L.Z.Vezirova and F.V.Hajiyeva	**Prof Ulviyya Hasanova**, Baku State University - **Azerbaijan**
13	Novel Fractal Metamaterial subwavelength structure for sensors application **Y Trabelsi** , H Alkorre , J Stiens , M Kanzari and R Vouncks	**Mr Youssef Trabelsi**, National Engineering School of Tunisia (ENIT) - **Tunisia**
14	Combined Mechanical Disordering – Reactive Synthesis, Possible Method of Bulk Nanocrystalline Intermetallics Obtaining **R.L. Orban**, A. Lawley and M. Orban	**Prof Radu Liviu Orban**, Technical University of Cluj-Napoca - **Romania**
15	Effect of blending ratio of polymer layer on structural properties of polymer-coated mesoporous silica nanoparticles **Ş. Ünal** and B. Özbek	**Ms Sule Unal**, Yildiz Technical University -**Turkey**.
16	Targetting and Applications of Magnetic Nanoparticles P. Taparia and **S. Jindal**	**Mr Srijan Jindal**, Indian Institute of Technology, Roorkee - **India**
17	InxGa1-xN/GaN QDs by coaxial growth on non-polar n-GaN NW J.H. Park, J.K. Sim, D.Y. Um, T.S. Jang, **D.S. Lee** and C.R. Lee	**Ms Da som Lee**, Chonbuk National University - **Republic of Korea**
18	The Effect Of Assembly Conditions and Nanoparticle Condi-tions on Size, Morphology and Polydispersity Of Magnetic Nanoparticle Clusters **S.M. Martyn** and D.F. Brougham	**Ms Sarah Martyn**, Dublin City University - I**reland**
19	Polyurethane/GO Nanocomposites and Vapor Barrier properties **E. Yoo**, K. Shim and H. Huh	**Mr Eunsung Yoo**, Korea Institute of Industrial Technology, Seoul – **Rep. of Korea**
20	Fabrication of Electrospun Polyvinyl Alcohol / Polysaccharide Com-posite Nanofibers and their Prebiotic and Antibacterial Activities **W. Wahbi**, R. Siam and W. Mamdouh	**Mrs Walaa Wahbi,** The American University in Cairo - **Egypt**
21	Efficiency improvement in Dye Sensidized Solar Cells by Plasmonic effect of green synthesized Silver Nanoparticles **S.Saravanan**, R.Kato, M.Balamurugan, S.Kaushik and T.Soga	**Prof Saravanan Shanmugam**, Sona College of Technology - **India**

15 June 2015

Posters Session I - B: Nanomaterials Characterization / Properties and Tools

N.	Title	Author/Affiliation/Country
1	Study of chirality by High Resolution Optical Microscope of Si-CNT Prepared by Plasma Sputtering without catalyst **B.M. Mustafa**, A.M. Ezzat and M.M. Uonis	**Dr Bassam M. Mustafa**, Mosul University, Mosul - **Iraq**
2	Gas-Generating Theranostic Nanoparticles for Ultrasound Imaging and Photodynamic Therapy D. J. Park, K. H. Min and **S. C. Lee**	**Prof Sang Cheon Lee**, Kyung Hee University-Seoul - **Rep. of Korea**
3	The application of ultrasonic spectroscopy to the study of the gelation and chain relaxation properties of dually crosslinked hydrogels **K. Khouzami**, C. Branca, C. Crupi, S. Rifici, G. Ruello, U. Wanderlingh and G. D'Angelo	**Dr Khaoula Khouzami**, Messina University - **Italy**
4	New challenges in TiO2 nanoparticle characterisation and separation by Flow Field Fractionation **J. Omar,** A. Boix, C. von Holst	**Dr Jone Omar**, EC-JRC-IRMM - **Belgium**
5	Diamagnetism of Superparamagnetic Ni Nanoparticles Incapsulated in Carbon Shells A. Manukyan, A. Mirzakhanyan, **H. Gyulasaryan**, M. Farle and E. Sharoyan	**Mr Harutyun Gyulasaryan**, Institute for Physical Research of National Academy of Sciences **- Armenia**
6	Beryllium oxide nanowires and their optical properties for dosimetric applications **E. Pajuste**, G. Kizane, J. Prikulis and D. Erts	**Dr Elina Pajuste**, University of Latvia - **Latvia**
7	Computer microscopy of biological liquid dry patterns for medical diagnostics and modeling of their properties by dissipative dynamics methods **P. Lebedev-Stepanov**, M. Buzoverya, I. Shishpor and K. Vlasov	**Dr Peter Lebedev-Stepanov**, Photochemistry Center RAS - **Russian Federation**
8	Theoretical studies on electronic and magnetic properties of a two-dimensional Mn-Pc and Mn-TCNB monolayers **M. Mabrouk** and R. Hayn	**Ms Manel Mabrouk**, Aix-Marseille University/CNRS - **France**
9	Band Structure of ABA-Trilayer Graphene Superlattice un-der the Application of Periodic Kronig-Penney Type of Potential **S. Uddin** and K. S. Chan	**Mr Salah Uddin**, City University of Hong Kong - **Hong Kong**
10	Fabrication of transparent AZO/ZnO/ITO ReRAM devices and their switching characteristics depending on the deposition tem-perature of ZnO active layer **K. Y. Kim**, C. H. Cho, H. J. Kim, E. L. Shim and Y. J. Choi	**Mr Kyu Young Kim**, Sejong University, Seoul - **Republic of Korea**
11	Physico-chemical properties Fe-doped alumino-silicate nanotubes **E. Bahadori**, E. Shafia, S. Esposito, M. Armandi and B. Bonelli,	**Ms Elnaz Bahadori**, Politecnico di Torino **- Italy**
12	Nanostructured Polymer Matrix Composites for High Performace Engineering Applications **T. Turcsán** and L. Mészáros	**Mr Tamas Turcsan**, Budapest University of Technology and Economics - **Hungary**
13	Fatigue properties of basalt fiber and carbon nanotube reinforced hybridcomposites **J. Szakács** and L. Mészáros	**Mr Jozsef Szakács**, Budapest University of Technology and Economics - **Hungary**
14	The influence of redistribution ions in subphase at the properties langmuir monolayer **A.S. Chumakov**, A.V. Ermakov, V.P. Kim, I.A. Gorbachev and E.G. Glukhovskoy	**Mr Aleksei Chumakov**, Saratov State University - **Russian Federation**
15	Control possibility of separation surfactant from nanoparticles solution by Langmuir method **K.I. Kosolapova,** A.J.K. Al-Alwani and E.G. Glukhovskoy	**Ms Kristina Kosolapova**, Saratov State University - **Russian Federation**
16	Analyzing size dependence of thermal conductivity of suspended graphene with Null-Point Scanning Thermal Microscopy G. Hwang and **O. Kwon**	**Prof Ohmyoung Kwon,** Korea University-Seoul - **Republic of Korea**
17	Three---Arm Star Block---Copolymers: Enzyme---Inspired Catalysts for Oxidation of Alcohols in Water **C. Mugemana**, B.-T. Chen, K. V. Bukhryakov and V. Rodionov	**Dr Clement Mugemana**, KAUST – **Kingdom of Saudi Arabia**
18	Hydrophobic Material with Polymeric Shell G. Sugurbekova, **A.Seralin,** G.Demeuova and M.Baisariyev	**Mr Aidar Seralin**, Nazarbayev University - **Kazakhstan**
19	New Performances of Fluorescent Photosensitive Glass Ceramics for Petabyte Optical Disk 3D Written by Direct Laser Interaction **S. I. Jinga**, E. Pavel	**Prof Sorin JINGA**, "Politehnica" University of Bucharest - **Romania**
20	Iron Nanoparticles-Doped Water Treatment Residues for Arsenic Removal from Industrial Wastewater P. Sarntanayoot and **A. Imyim**	**Dr Apichat Imyim**, Chulalongkorn University-Bangkok-**Thailand**
21	Transfer and biotransformation of gold and silver nanoparticles through aquatic food chain **X. Zhao**, Qunfang Zhou and Guibin Jiang	**Dr Xingchen Zhao**, Chinese Academy of Sciences- **China**
22	Functionalization of textile materials by TiO2/RGO composites to enhance the photocatalytic degradation of Rhodamine B under light irradiation **V. Teixeira**	**Prof Vasco Teixeira**, University of Minho - **Portugal**

16 June 2015
Posters Session II - A: Nanotech in Life Sciences and Medicine

N.	Title	Author/Affiliation/Country
1	Assessment of protein aggregates in the presence of nanoscale vaccine adjuvants. **M.J.W. Johnston** and G.E. Frahm.	**Dr. Michael Johnston**, Biologics and Genetic Therapies Directorate, Health Canada- Ottawa- **Canada**
2	Kiteplatin Delivery by Hydroxyapatite Nanocrystals for the Treatment of Cancer. **N. Margiotta**, M. Lelli, V. Gandin, C.Marzano, S. Merli, S.Savino,N. Roveri, J.D. Hoeschele and G. Natile	**Prof. Nicola Margiotta**, University of Bari Aldo Moro, Bari - **Italy**
3	Self Micro-Emulsifying Drug Delivery Systems (SMEDDS) of Clove Oil for Fish Anesthesia **K. Janngeon**, S. Pikulkaew, W. Chaisri and S. Okonogi	**Ms Kantaporn Janngeon**, Chiang Mai University, Chiang Mai - **Thailand**
4	Development and characerization of bovine serum albumin nanoparticles of amphotericin B **D. B. Ludwig**, L. S. Pedroso, N. M. Khalil and R. M. Mainardes	**Mr Daniel Brustolin Ludwig**, State University of Midwest - **Brazil**
5	Curcumin-loaded Bovine Serum Albumine Nanoparticles: Development and evaluation of stability and antioxidant activity. **L. E. A. Camargo**,R. M. Mainardes and N. M. Khalil	**Mrs Luciana Camargo**, University of Midwest - **Brazil**
6	Silver Sub-nanometric Quantum Clusters as Potential Therapeutic Agents in Fight against Cancer **J.M. Blanco**, J. Calvo, E. Carbó Argibay, E.B. Alonso, F. Domínguez, M. A. López Quintela, and J. Rivasa,	**Mr Jose Blanco**, International Iberian Nanotechnology Laboratory - **Portugal**
7	Development of the nanoconjugate for liver fluke targeting **A.G.Pershina**, A.M.Demin, V.V.Ivanov, O.B. Shevelev, M.A. Uimin, K.V. Nevskaya, N.N. Shegoleva, A.S. Minin, A.E. Sazonov, V.P. Krasnov and L.M. Ogorodova	**Dr Alexandra Pershina**, Siberian State Medical University - **Russian Federation**
8	A Peptide-Based Drug Design to Overcome Major Challenges on Cancer Treatments **A. Sanchez**, A.D. Tinoco and L. Parham	**Ms Annelis Sanchez**, University of Puerto Rico - **Puerto Rico**
9	Superparamagnetic Iron Oxide Nanoparticles for Stem Cell Tracking by Magnetic Resonance Imaging **N. Guldris**, B. Argibay, Y.V. Kolen'ko, E. Carbó-Argibay, R. Iglesias, F.Campos, L.M. Salonen, M. Bañobre-López, J.Castillo and J. Rivas	**Ms Noelia Guldris**, International Iberian Nanotechnology Laboratory, Braga - **Portugal**
10	Phenylethyl Resorcinol in Nioesomes for Cosmetic formulation **J. Buruschat** and T. Amnuaikit	**Ms Janejira Buruschat**, Prince of Songkla University-Songkhla - **Thailand**
11	Nanostructured lipid carriers containing amazon natural lipids for the encapsulation of benzophenone-3 **P.A. Lima** and N. Durán	**Ms Paula Lima**, State University of Campinas (UNICAMP) - **Brazil**
12	Effect of phospholipid and ethanol concentrations on physical property of phenylethyl resorcinol loaded ethosome **T. Limsuwan**, P. Boonme and T. Amnuaikit	**Ms Tunyaluk Limsuwan**, Prince of Songkla University - **Thailand**
13	Clove Oil Loaded Nanoemulsions for Fish Anesthesia **S. Okonogi**, K. Janngeon, W. Chaisri and S. Pikulkaew	**Dr Siriporn Okonogi**, Chiang Mai University, Chiang Mai - **Thailand**
14	Optimization of in vitro conditions to treat cancer with magnetic hyperthermia **V. Vilas-Boas**, B. Espiña, Y. Kolen'ko, M. Bañobre-Lopez, V. Martins and F. Carvalho	**Ms Vania Vilas-Boas**, International Iberian Nanotechnology Laboratory (INL) - **Portugal**
15	Effective VEGF Binding to Au Nanocrystals with {111} Facets **J.H. Kim**, D.H. Jo, J.W. Hong, S.W. Han and J.H. Kim	**Prof Jeong Hun Kim**, Seoul National University Hospital - **Republic of Korea**
16	Toxicological Aspects of Graphene Oxide on Gill Cells of Adult Zebrafish (Danio rerio) **J. P. Souza**, I. M. M. Paino, F. Santos, P. F. M. Nogueira and V. Zucolloto	**Mrs Jaqueline Souza**, University of São Paulo - **Brazil**
17	Effect of Particle Size on Oral Absorption, Tissue Distribu-tion, and Excretion of Food Grade Titanium Dioxide and Silica Nanoparticles **M-R. Jo** and S-J. Choi	**Ms Mi-Rae Jo**, Seoul Women's University - **Republic of Korea**
18	Anti-angiogenic Effect of Gold and Silica Nanoparticles on Choroidal Neo-vascularization: Size Matters, Core does not **J. H. Kim**, D.H. Jo, Y. Piao, T.G. Lee, and J.H.Kim	**Dr Jin Hyoung Kim,** Seoul National University Hospital - **Republic of Korea**
19	Synthesis and surface modification of Fe3O4@SiO2@Au NPs as theranostic agents for Nanomedicine applications. **I. Monaco**, N. T. Hong, E. Locatelli and M. Comes Franchini	**Mrs Ilaria Monaco**, University of Bologna - **Italy**
20	Interactions of Zinc Oxide Nanoparticles with Dispersants: Cytotoxicity, Uptake, and Pharmacokinetics **S. J. Choi**	**Prof Soo-Jin Choi**, University of Seoul Women's University - **Republic of Korea**
21	Transdermal resveratrol nanoethosomes; Preparation, Op-timization; In-vitro, and In-vivo evaluation **H. Aldawsari** and K. Hosny	**Dr Hibah Aldawsari**, King Abdulaziz University, Jeddah - **Kingdom of Saudi Arabia**
22	Incorporation and release of gemcitabine prodrug in mesoporous silica nanoparticles	**Dr Barbara Stella**, University of Torino - **Italy**

	G. Berlier, A. Malfanti, I. Miletto, E. Bottinelli, D. Zonari, G. Blandino, **B. Stella** and S. Arpicco	
23	Visual Analysis of Water permeability in Aquaporin Z incorporated Giant Unilarmellar Vesicles **J-H. Lee**, H. Ryu, T-J. Jeon and Y-R. Kim	**Ms Jun-Hee Lee**, Kyunghee University - **Republic of Korea**
24	The production and the characterization of SPIO Nanoparticles for mediate tranfection of plasmid DNA **Z. Fohlerová**, D. Kovář and J. Hubálek	**Dr Zdenka Fohlerova**, CEITEC BUT - **Czech Republic**
25	Gold nanoparticle-based Immunoprecipitation (IP) sensor for Detection of Shiga toxin (Stx) from pathogenic Escherichia coli **K-B. Jeong**, J-H. Lee, M-C. Lim and Y-R. Kim	**Mr Ki-Baek Jeong**, Kyung Hee University, Yongin - **Republic of Korea**
26	Development of intelligent Drug Delivery Systems based on thermoresponsive gold nanoparticles **A. Cortijo Martín**, B. van Mele and G. Bruylants	**Mrs Ana Cortijo Martín**, Université libre de Bruxelles - **Belgium**
27	Development of a Mdm2 specific colorimetric biosensing platform using gold nanoparticles **M. Retout**, K. Bartik, Th. Doneux and G. Bruylants	**Mr Maurice Retout**, Université Libre de Bruxelles - **Belgium**
28	Enhanced Antibacterial Activity of Antibiotics in Combination with Silver Nanoparticles against Animal Bacteria **M. Smekalova**, V. Aragon, A. Panacek, L. Kvitek and R. Zboril	**Ms Monika Smékalová**, Palacky University in Olomouc - **Czech Republic**
29	The mechanisms for the radiosensitizing effects in high linear energy transfer radiation on colon cancer cells **E.H. Kim**, Y.K. Jeong, I. Cho, S.H. You, S.H. Cho and W-G. Jung	**Prof Eun Ho Kim,** Korea Institute of Radiological and Medical Sciences-Seoul- **Rep. of Korea**
30	Advantages and Obstacles of Using Microfluidic Based Immunoassay for the Detection of Cancer Biomarkers from Biofluids **R. Khnouf**, D. Karasneh, A. Elbetieha and B. Albiss	**Dr Ruba Khnouf**, Jordan University of Science and Technology, Irbid - **Jordan**
31	Efficient Encapsulation of Carboplatin Anticancer Molecule into Boron Nitride Nanotube : a Promising Drug Nanovector **M. El Khalifi**, E. Duverger, T. Gharbi, H. Boulhadour and F. Picaud	**Dr Mohammed El Khlalifi**, Université Franche-Comté University, Besançon - **France**
32	Atomistic binding energy and Coarse grained simulation studies to understand the structure and drug release activity of Vancomycin loaded Lipid Polymer Nanoparticles (LPNs) S.B. Vepuri, N. Seedat, R. Kalhapure, C. Mocktar, M. Soliman and **T. Govender**	**Prof Thirumala Govender**, University of KwaZulu-Natal, Durban - **South Africa**
33	Reliability, Availability, Maintainability and Safety Analysis for the Development of a Nano-material Plant **E. Davarpanah** and A. Carpignano	**Ms Elahe Davarpanah**, Politecnico di Torino - **Italy**
34.	Development of Liposomal Nanocarriers for Near-Infrared Dye: Preparation and Physico-Chemical Characterization **S. Koudelka**, J. Masek, R. Mikulik and J. Turanek	**Dr Stepan Koudelka**, St. Anne´s University Hospital Brno, Brno - **Czech Republic**
35	Improved Antimicrobial Activity of Electrospun Graphene-Chitosan/Gelatin Nanofibrous-Based Nanocomposite Scaf-folds **I.H. Ali**, A. Ouf, M.B. Taskin, J. Song, M. Dong, M. Chen, R. Siam and W. Mamdouh	**Ms Isra H. Ali**, The American University in Cairo- **Egypt**
36	Honey Chitosan Nanofibers Loaded With Natural Antimicrobials for Wound Dressing Applications **W.A. Sarhan** and H. M.E Azzazy	**Mrs Wessam Sarhan**, The American University in Cairo- **Egypt**
37	Doxorubicin loaded, pH-sensitive biodegradable naonogels and their bio-evaluation **P. Kumar**, N. Yadav, A. Chhikara and M. Chopra	**Mr Parveen Kumar**, University of Delhi- **India**
38	Increasing the efficiency of anticancer therapies using mono-dispersed chitosan nanoparticles **M.J. Masarudin**, S.M. Cutts, D.R. Phillips and P.J. Pigram	**Dr Mas Jaffri Masarudin,** Putra University - **Malaysia**
39	siRNA and miRNA-basedSNAs to target canonical and non-canonical Bcl-2 signaling in glioblastomas **A.Chalastanis**, F.M.Kouri, S.A.Jensen, Lisa A.Hurley and A.H.Stegh	**Dr Alexandra Chalastanis**, Northwestern University- **USA**
40	Nanosensors and nanomaterials for biomedicine **N.Casanova-M**, B. Céspedes, M Cisternas, N. Figueroa, R Gonzáles, A. Chandia, C. Contreras, R Segura, P. Conejeros, F. Morales, M. Kogan, C.A.M. Wilson, M.Favre, H. Bhuyan, A.R Alvarez, S.A.Hevia and JR Maze	**Dr Nathalie Casanova**, Pontificia Universidad Catolica - **Chile**

16 June 2015
Posters Session II - B: Nanoelectronics

N.	Title	Author/Affiliation/Country
1	Nanoscale Photonic Humidity Sensor Based on the Fluorescence Lifetime of BODIPY Dye Molecules S. Acikgoz, **H. Yungevis**, M.N. Inci and A. Sanyal	**Mr Hasan Yungevis**, Karamanoğlu MehmetBey University - **Turkey**
2	Silicon Carbide Tunable MEMS Resonator with Wide Operation Range **B. Svilicic**, E. Mastropaolo and R. Cheung	**Dr Boris Svilicic**, University of Rijeka - **Croatia**
3	High Mobility Materials For the Channel of DG Mosfet **S.Slimani** and B. Djellouli	**Ms Samia Slimani**, Mouloud Mammeri University (UMMTO) - **Algeria**
4	Lithium cobalt oxide thin films towards resistive memories **V.S.Nguyen**, Van Huy Mai, Alec Moradpour, Pascale Auban Senzier, Claude Pasquier, Kang Wang, …and Olivier Schneegans	**Mr Van Son Nguyen**, Paris-Sud University and UPMC**- France**
5	Tunable Luminescence Carbon nanoparticles From Carbohydrate Foodstuff **L. A. Adams**, K. Fagbenro-Owosheni, and A. Badejo	**Dr Luqman Adams**, University of Lagos, **Nigeria**
6	Modal parameter identification of perforated microplates from output data only **J. Lardiès**	**Prof Joseph Larides**, FEMTO-ST Institute - **France**
7	The Effect of 2-step Plasma Treatment for Single-walled Carbon Nanotube on Electrochemical Sensors **J.H. Kim**, K.B. Kim, C.W. Park and N.K.Min	**Mr Joon Hyub Kim**, Korea University-Chungnam – **Rep. of Korea**
8	Theoretical predictions of luminescence due to cyclosiloxanes in nanostructured Silicon Rich Oxide films employing the Global Reactions Model. N.D. Espinosa-Torres, J.A. Luna-López, **J.F.J. Flores-Gracia**, A.D. Hernández de la Luz, J. Martínez-Juárez and G. Flores-Carrrasco	**Dr Francisco Flores**, Benemérita Universidad Autónoma de Puebla - **Mexico**
9	Sensing Low Magnetic Field by Using Planar Hall Effect Sensor I. Song, S.H. Aiden Lee, **S.J. Kim** and C.G. Kim	**Mr Sung Joon Kim**, Daegu Gyungbuk Institute of Science and Technology (DGIST) – **Rep. of Korea**
10	Active plasmonics: Growing Gold Nanoparticles on a Flexible Substrate to enable simple mechanical control of their plasmonic coupling **U. Cataldi**, R. Caputo, Y. Kurylyak, G. Klein, M. Chekini, C. Umeton and T. Burgi	**Dr Ugo Cataldi**, University of Geneva - **Switzerland**
11	PU-RGO composites and its properties for thermal conductive adhesive **S. Choi**, S. Park and H. Huh	**Mr Sukhoon Choi**, Korean Institute of Industrial Technology(KITECH), Incheon - **Rep. of Korea**

16 June 2015

Posters Session II - C: Nano MatEn 2015 - Nanotech for Energy and Environment

N.	Title	Author/Affiliation/Country
1	Leaching of Nano-SiO2 from Municipal Solid Waste E.T. Sakallıoglu, M. Bakırdoven, I. Temizel, C.S.Uyguner- Demirel, **B. Demirel**, N.K. Copty, T.T. Onay and T. Karanfil	**Prof Burak Demirel**, Bogazici University, Institute of Environmental Sciences-Istanbul - **Turkey**.
2	The Role of Al2O3 and SiO2 Nanoparticles on the Cycleability of Li-Air Batteries with TEGDME-PEO/LiPF6 Electrolytes **A.Akbulut Uludağ**, M. Tokur, H. Algul, T. Cetinkaya, M. Uysal and H. Akbulut	**Mrs Ahsen Akbulut Uludag**, Sakarya University - **Turkey**
3	Transparent Hydrophobic Nanolayers on ETFESiOx Substrates for Solar Cells Encapsulation **G. Rossi**, P. Scarfato, L. Incarnato	**Dr Gabriella Rossi**, University of Salerno - **Italy**
4	Photovoltaic Response of Non-Toxic CuInS2 Quantum Dot based Conducting Polymer Composite Films **I. Singh**, J. Singh, A. Kumari, P.K. Rao and P.K. Bhatnagar	**Mr Inderpreet Singh**, University of Delhi- **India**
5	Benefits of a compact TiO2 layer for the elaboration of transparent TiO2 nanotubes array on conducting glass **A. Krumpmann** and A. Decroly	**Mr Arnaud Krumpmann**, University of Mons - **Belgium**
6	Study of LiFePO4 thin films as Li-ion battery cathode by in-situ electrochemical atomic force microscopy in aqueous electrolyte J. X. Wu and **G. Y. Shang**	**Prof Guangyi Shang**, Beihang University, Beijing - **China**
7	Textured fabrication of CdS/CdTe thin film PV cell with back contacts **M. Sridar Ilango** and S.K Ramasesha	**Mr Murugaiya Sridar Ilango**, Indian Institute of Science - **India**
8	Nonradiative Electron and Hole Relaxation Dynamics in Organometallic Halide Perovskites **M.E. Madjet,** F. El-Mellouhi, G. Berdiyorov, S. Ashhab, A. Akimov and S. Kais	**Dr Mohamed El-Amine Madjet**, Qatar Environment & Energy Research Institute, Qatar Foundation - **Qatar**
9	C-Nanotube Based Infrared Thermo-Voltaic Cells and Detectors T.Hosseini, N.Yavarishad and **N. Kouklin**	**Dr Nikolai Kouklin**, University of Wisconsin - **USA**
10	Natural Biodefensive Nanoparticles for Pest Control in Soy Culture **A.L. Santos**, V. Zucolotto, B.T.R. Rhein, I. Pezzopane and G.Rosa	**Dr Amanda Santos**, Nanomed Inc., São Carlos - **Brazil**
11	Sol-Gel Production and Electrochemical Characterization of Free-Standing Metal Oxide/MWCNT Nanocomposite Anodes for Li-Ion Batteries **H. Köse**, Ş. Karaal, A. O. Aydın, H. Akbulut	**Ms Hilal Kose**, Sakarya University - **Turkey**
12	The Effect of Different Solvent Combination of LiBF4 Electrolyte on Free-Standing SnO2/MWCNT Nanocomposite Anode Capacity for Li-ion Batteries **Ş. Karaal**, H. Köse, A. O. Aydın and H. Akbulut	**Mrs Seyma Karaal**, Sakarya University- **Turkey**
13	Photocatalytic Activities of ZnO and ZnO/ZnS Synthesized by Microwave-Hydrothermal Method **N. Güy**, Ş; Durmuş and M. Özacar	**Mrs Nuray Guy**, Sakarya University - **Turkey**
14	Polystyrene Micro/Nanofibers and its Application in the Removal of Crude Oil Spills **M. Alazab Alnaqbi**, A. Al Blooshi, Y. Greish and M. Mohsin	**Dr Mohamed Alazab Alnaqbi**, United Arab Emirates University, Al Ain - **United Arab Emirates**
15	Effects of biopolymer nano coils on sand dune stabilization and dust controlling **M. Aghaei Moghadam** and K. Zangeneh	**Mr Mostafa Aghaei**, Biopolynet Inc-Fredericton - **Canada**
16	Carboxymethyl-nanocellulose:a versatile raw-material in coating industry **A. Reis**, R. Duarte, J. Tedim, A. Caetano, A.P. Mendes de Sousa, J. Ataíde and D. Evtuguin	**Dr Ana Reis**, University of Aveiro - **Portugal**
17	Graphene Reinforced Concrete M.F. Craciun and **D. Dimov**	**Mr Dimitar Dimov**, University of Exeter - **United Kingdom**
18	Quantum Dot Sensitized Solar Cells with Cuprous Sulfide Counter Electrode N.M. Ferreira, C. Bernardo, I. Moura, P. J.G. Coutinho, A.G. Rolo, M. Vasi-levskiy, M. Pastor, F. Fernandes, V. Teixeira, J.O.Carneiro and **A. Samantilleke**	**Prof Anura Samantilleke**, Minho University - **Portugal**
19	Reduced graphene oxide on TiO2 nanorods and nanotubes photo-anode for solar hydrogen evolution **H. Kim and** B. L.Yang	**Mr Hyun Kim**, Kumoh National Institute of Technology, Geongbuk – **Rep. of Korea**
20	Silicon Nanowire as an Effective Absorber for Solar Cell Application: Fabrication and Numerical Simulation M. K. Hossain, **B. Salhi**, A. W. Mukhaimer and F. A. Al-Sulaiman	**Dr Billel Salhi**, King Fahd University of Petroleum and Minerals (KFUPM), Dhahran - **Saudi Arabia**
21	Environmentally Friendly Design of Tailor-Made Nano-porous Polymeric Gas Adsorbents **W.A. El-Mehalmey**, T. Madkour and R. A. Azzam	**Dr Worood El-Mehalmey**, American University in Cairo - **Egypt**
22.	Silica-based nanocoating and LDHs sensors for enhancement of paperboard barrier properties **V.M. Dias**, A. Kuznetsova, I. Portugal, J. Tedim, A.A. Yaremchenko and D. V. Evtuguin	**Dr Vânia Dias**, University of Aveiro-**Portugal**

Advanced Nanomaterials:
Synthesis / Fabrication, Characterization and Tools
Keynote Talks

New frontiers in the science of nanostructured materials for information technology

Albert Fert [1, 2]

[1] Unité Mixte de Physique CNRS/Thales, 1 av Fresnel, F91767 Palaiseau, France
[2] Université Paris-Sud, F91405 Orsay, France

Most of the recent advances in the information technologies (computing, communications) come from the creation of nanomaterials and nanostructures. I will review some of these recent advances and the next prospects in several fields of the information technologies:

- Information storage: from the magnetic storage in HDD to the perspective with spintronics and skyrmions.
- Nonvolatile magnetic memories.
- Ferroelectric memories and perspective for bio-inspired computing.
- Spintronics with graphene.

State-of-the-Art in Metal Matrix Composites Reinforced with Carbon Nanotubes by Powder Metallurgy Process

K. Kondoh
Osaka University, Joining and Welding Research Institute, Osaka, Japan

Abstract: Multi-wall carbon nanotube (MWCNT) is one of the effectively promising reinforcement materials to improve the mechanical properties such as hardness, strength, and Young's modulus of the composite materials. From a viewpoint of uniform dispersion of CNTs in matrix of the composites, two kinds of mixing processes were employed in this study; wet and dry mixing techniques. Regarding the former process, polar zwitterions generally have a high solubility in water, but a poor solubility in most organic solvents. 3-(N, N-dimethylstearylammonio) propanesulfonate, a typical linear zwitterionic surfactant used in this study, had both hydrophobic and hydrophilic groups. Electrostatic interactions, having larger attractive forces than the van der Waals forces between CNTs, occur at the hydrophilic because of the positive charge and negative charges on their headgroups. Therefore, the un-bundled CNTs are uniformly dispersed in the zwitterionic surfactant solution. The metal powders are dipped in this solution, and the composite powders coated with CNT films are prepared after removing the solution. Figure 1 shows a typical surface of metal powders coated with CNTs. The dry mixing process suggests that the high-energy ball milling equipment is employed to mix the metal powders with CNTs under the controlled atmosphere such as vacuum and argon gas. In general, CNTs have some mechanical damages during the dry mixing process, however, this process is remarkably cost-effective compared to the above wet process to disperse CNTs. By changing the sintering temperature, CNTs could be easily transferred to nano-scale carbides, which are also effective reinforcemnets of the composites. MWCNTs are mechanically mixed with pure aluminum (Al) powder by high-energy planetary ball milling (PBM) process, and shorted CNTs were dispersed inside and at the surface of Al powder. They were consolidated by SPS and followed hot extrusion. SPS was effective for complete reaction of CNTs with Al powder to synthesize Al_4C_3 nano-rods, which were dispersed in the matrix. The nano-dispersoids and grain refinement of α-Al caused the significant improvement of mechanical strength of pure Al matrix composites. TEM observation results of the Al_4C_3/Al composite are shown in Figure 2. In-situ nanorods had basal planes (001) of the hexagonal crystal paralleled to their axis direction. From the bright field TEM images and corresponding selected area diffraction (SAD) patterns, the nanorods were identified as single-crystal Al_4C_3. The nominal tensile stress-strain (S-S) curves shown in Figure 3 indicated yield strength and ultimate tensile strength of Al_4C_3/Al composites were attained to 307 MPa and 403 MPa, respectively. They are 90% and 78% enhanced compared with those of the reference pure Al material (162 MPa and 226 MPa) processed at same conditions, respectively.

Keywords: carbon nanotubes, powder metallurgy, composite material, reinforcements, aluminium, titanium, zwitterionic surfactant, dry mixing.

References:

Kondoh, K., Threrujirapapong, T., Umeda, J., Fugetsu, B, High-temperature properties of extruded titaniumcomposites fabricated from carbon nanotubes coated titanium powder by spark plasma sintering and hot extrusion, (2012), *Composites Science and Technology*, 72, 1291–1297.

Chen, B., Jia, L., Li, S., Imai, H., Takahashi, M., Kondoh, K, In Situ Synthesized Al4C3 Nanorods with Excellent Strengthening Effect in Aluminum Matrix Composites, (2014), *Advanced Engineering Materials*, 16, 972-975.

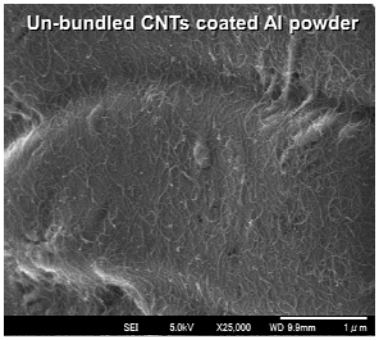


Figure 1: SEM observation on Al powder surface coated with un-bundled CNTs via wet mixing

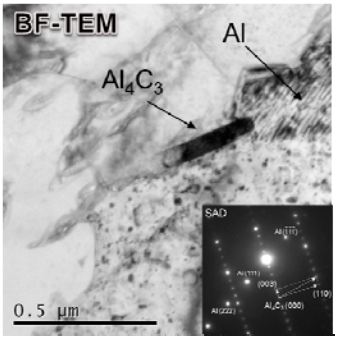


Figure 2: TEMobservation on Al_4C_3/Al composite and SAD pattern of typical $Al4C_3$.

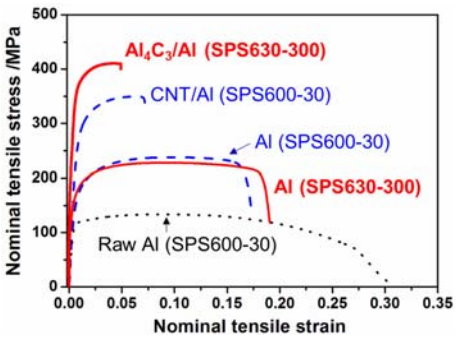


Figure 3: Tensile S-S curves of extruded Al composites reinforced with Al_4C_3 and CNT as well as pure Al by PM process.

Designed Chemical Synthesis and Assembly of Uniform-sized Nanoparticles for Medical and Energy Applications

Taeghwan Hyeon[1,2,*]
[1]Center for Nanoparticle Research, Institute for Basic Science (IBS), Seoul 151-742, Korea
[2]School of Chemical and Biological Engineering, Seoul National Universtiy, Seoul 151-742, Republic of Korea

Abstract: Over the last 10 years, our laboratory has focused on the designed chemical synthesis, assembly and applications of uniform-sized nanocrystals. In particular, we developed a novel generalized procedure called as the "heat-up process" for the direct synthesis of uniform-sized nanocrystals of many metals, oxides, and chalcogenides.

Recently our group has been focused on medical applications of various uniform-sized nanoparticles. Using 3 nm-sized iron oxide nanoparticles, new non-toxic MRI contrast agent was realized for high resolution MRI of blood vessels down to 0.2 mm. We demonstrated that ceria nanoparticles protect against ischemic stroke in an in vivo animal model. We reported the first successful demonstration of high-resolution in vivo three-photon imaging using biocompatible and bright Mn^{2+} doped ZnS nanocrystals. We fabricated tumor pH-sensitive magnetic nanogrenades composed of self-assembled iron oxide nanoparticles and pH-responsive ligands for theranostic application, enabling the visualization of small tumors of < 3 mm via pH-responsive T1 MRI and fluorescence imaging and superior photodynamic therapeutic efficacy in highly drug-resistant heterogeneous tumors. We synthesized tumor pH-sensitive nanoformulated triptolide coated with folate targeting ligand to treat hepatocellular carcinoma (HCC), which has one of the worst prognosis for survival as it is poorly responsive to both conventional chemotherapy and mechanism directed therapy.

We reported the large-scale synthesis of magnetite nanocrystals imbedded in a carbon matrix and hollow iron oxide nanoparticles. We demonstrated galvanic replacement reactions in metal oxide nanocrystals. When Mn_3O_4 nanocrystals were reacted with iron(II) perchlorate, hollow box-shaped nanocrystals of Mn_3O_4/γ-Fe_2O_3 ("nanoboxes") were produced. These iron oxide-based nanomaterials exhibited very high specific capacity and good cyclability for lithium ion battery anodes.

E-mail: thyeon@snu.ac.kr

Nanomaterials for Biomedical and Green Chemistry Applications

Jackie Y. Ying
Institute of Bioengineering and Nanotechnology, Singapore

Abstract: Nanocrystalline materials are of interest for a variety of applications. This talk describes the design and functionalization of nanocomposite materials for biological and chemical applications. Specifically, we have synthesized metallic, metal oxide and semiconducting nanocrystals for bioimaging, bioseparation, biosensing, theranostic, fuel cell and catalytic applications. These nanocrystals are $\leq$ 10 nm in size, and are surface modified to provide for high dispersion, biocompatibility, and water solubility. They are used as building blocks to create multifunctional nanocomposite particles with unique properties.

Nanoporous materials have also been developed with high surface areas and high porosities. We have synthesized nanoporous materials that are made of silica, transition metal oxides, and organic backbone. These systems can be tailored with a high density of functional groups either on the surface or in the framework of the materials. They demonstrated excellent properties as heterogeneous or heterogenized catalysts, providing high activity and recyclability. They are also useful as adsorbents for green chemistry applications.

Keywords: biomedical, nanomaterials, green chemistry, catalysts.

Session I: Nanomaterials Fabrication/ Synthesis

Hyperbranched-Polydendrons: A New Materials Platform for Advanced Polymer Technologies

F L. Hatton,[1] H. Rogers,[1] A. Dwyer,[1] L. M. Tatham,[2] L. R. Tidbury,[2] P. Chambon,[1] A.Owen,[2] S. P. Rannard[1]

[1] Department of Chemistry, University of Liverpool, Crown Street, L69 7ZD, UK

[2]Department of Molecular and Clinical Pharmacology, University of Liverpool, Block H, 70 Pembroke Place, Liverpool L69 3GF

Abstract: Complex polymer architectures often have functional benefits that are not achievable through simple or straightforward synthesis strategies such as self-assembly, tuneable surface interactions, phase separation and stimuli-responsive behaviour. Over recent years we have developed a highly flexible synthetic approach that offers complex polymer architectures through non-complex chemistry. Through the concerted propagation and branching of vinyl polymerisations initiated using dendron-derived initiators, very high molecular weight polymers bearing dendrons at one chain-end of each primary chain within a branched core can be generated [1]. These new architectures – hyperbranched Polydendrons – present considerable opportunities for advanced materials science. Our studies of branched polymer nanoprecipitation [2,3] and hyperbranched Polydendron nanoprecipitation have led to a platform approach allowing considerable synthetic flexibility. The formation of highly uniform nanoparticles which have the added benefits of being able to encapsulate small molecules whilst being salt stable have enabled studies as materials for nanomedicine. Pharmacological studies have shown a low cytotoxicity and the potential to also control the interactions with a range of cell types including accumulation in phagocytic and non-phagocytic cells and permeation through model gut epithelium [4]. Such permeation offers the long term potential for circulating nanoparticles after oral dosing; a major challenge for nanomedicines for chronic disease therapy. The flexibility and progress to date will be described in detail including initial results of these materials within a nanomedicine context.

Keywords: polymer architecture, controlled polymerization, dendrimers, nanomedicine, pharmacology, infectious diseases

References:

[1] F. L. Hatton, P. Chambon, T. O. McDonald, A. Owen, S. P. Rannard Hyperbranched polydendrons: a new controlled macromolecular architecture with self-assembly in water and organic solvents *Chem. Sci*., 2014, 5, 1844-1853.

[2] R. A. Slater, T. O. McDonald, D. J. Adams, E. R. Draper, J. V. M. Weaver, S. P. Rannard Architecture-driven aqueous stability of hydrophobic, branched polymer nanoparticles prepared by rapid nanoprecipitation *Soft Matter*, 2012,8, 9816-9827

[3] J. Ford, P. Chambon, J. North, F. L. Hatton, M. Giardiello, A. Owen, S. P. Rannard Multiple and Co-Nanoprecipitation Studies of Branched Hydrophobic Copolymers and A–B Amphiphilic Block Copolymers, Allowing Rapid Formation of Sterically Stabilized Nanoparticles in Aqueous Media *Macromolecules* 2015 DOI 10.1021/acs.macromol.5b00099

[4] F. L. Hatton, L. M. Tatham, L. R. Tidbury, P. Chambon, T. He, A Owen, S. P. Rannard Hyperbranched Polydendrons: A New Nanomaterials Platform With Tuneable Permeation Through Model Gut Epithelium *Chem. Sci.*, 2015, 6, 326-334

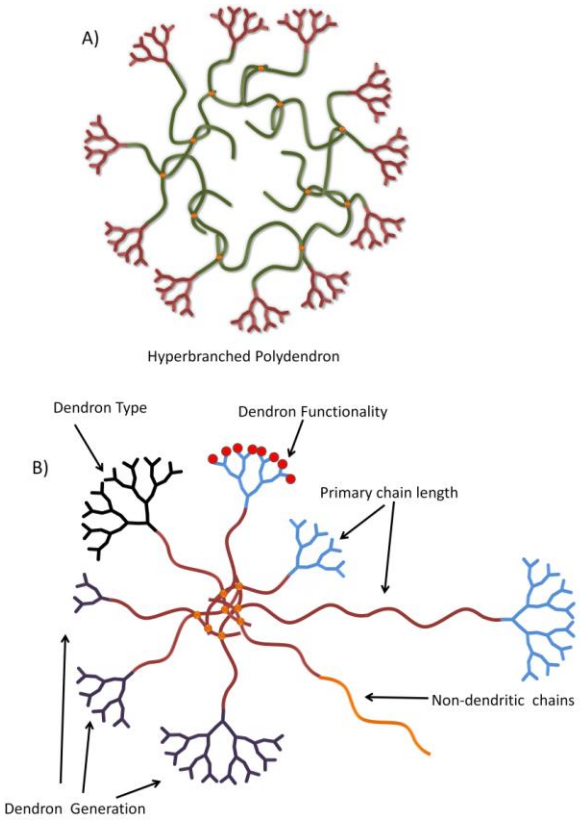


Figure 1: Schematic presentations of A) hyperbranched-polydendron, and B) Synthetic flexibility with the hyperbranched polymderon platform

New geometric model for carbon nanocones incorporating curvature

Barry J. Cox and James M. Hill*
Nanomechanics Group, School of Mathematical Sciences
University of Adelaide, SA 5005, Australia
*Corresponding author: Email jim.hill@adelaide.edu.au

Abstract: The conventional rolled-up model for carbon nanocones assumes that the cone is constructed from a rolled-up graphene sheet joined seamlessly, which predicts five distinct apex angles. This model completely ignores any effects due to the changing curvature and all bond lengths and bond angles are assumed to be those for the planar graphene sheet. Clearly curvature effects will become more important closest to the cone apex, and especially so for the cones with the smaller apex angles. For carbon nanotubes the present authors have proposed an exact polyhedral model that properly incorporates a hexagonal framework in which the bond angles and bond lengths are all assumed identical in the cylindrical configuration, and by necessity the sum of the bond angles is less than 360 degrees. In this talk we propose a corresponding model for carbon nanocones, but in this case it is not possible to produce a completely analogous model, since the cone structure does not have precise equality of all bond lengths and bond angles. The curvature changes along the length of the nanocone, and so too does the angle sum of the three bond angles at each carbon atom. Therefore, it is not expected that every point in the graphene lattice can be exactly congruent with all others. Here we derive an analytical expression for the cone radius applicable at any distance along the cone wall and we also derive an integral expression for the correction to the conical height, which goes some way towards accounting for the varying curvature of the cone wall. Predicted bond angles and bond lengths are shown to agree well with those obtained by relaxing the conventional rolled-up model using the LAMMPS software.

References

B. J. Cox and J. M. Hill,``Exact and approximate parameters for carbon nanotubes", Carbon, 45 (2007) 1453-1462.
B. J. Cox and J. M. Hill,``Geometric structure of ultra-small carbon nanotubes", Carbon, 46 (2008) 711-713.

Keywords: cone geometry; conventional rolled-up model; curvature effects; new geometric model.

New Synthesis of Cobalt Nanoparticles with Tunable Size in Ionic Liquids

Bishoy Morcos,[1,2,*] P.-H. Haumesser,[2] C. C. Santini[1]
[1] Université de Lyon, CNRS-UMR 5265, 43 Bd du 11 Novembre 1918, 69616, Villeurbanne Cedex, France.
[2] CEA–LETI-Minatec Campus, 17 rue des Martyrs, 38054 Grenoble Cedex 9, France.
bishoy.morcos@cea.fr

Abstract: Mono-dispersed metallic nanoparticles (NPs) represent a very interesting area of research owing to their special magnetic, electrical, optical and thermal characteristics. These unique properties originate from quantum effects as well as very high surface to volume ratio of such small particles. Cobalt (Co) NPs represent one of the most interesting metallic NPs because of their potential applications in catalysis, data storage, and magnetic fluids. They also find applications in the field of medication and diagnosis based on their unique magnetic properties. Co NPs are typically produced using either physical or chemical methods. As an example for physical synthesis, Co NPs can be prepared by direct current arc plasma evaporation method (Meng *et al.* 2012). The problem with such techniques is the lack of control on size for particles smaller than 100 nm (Balzani 2005). Chemical methods usually provide perfect control on size for nanoparticles that are very small up to 1 or 2 nm, *e.g.* the Co NP synthesis by chemical reduction of a selected Co organometallic precursor (1,5-cyclooctadiene)(cycloocta-dienyl) Cobalt (I), Co(COD)(COE) in the presence of ligand or polymer (Chaudret *et al.* 2007; Comesana-Hermo *et al.* 2014) or by thermal decomposition of Co carbonyl compounds requiring high temperature (Vollmer *et al.* 2011).

Ionic liquids (ILs) represent an important class of materials used to prepare metallic NPs. ILs not only act as solvents but also as stabilizing media because they possess high degrees of self-organization at the nano scale (Gutel *et al.* 2009; S. Campbell *et al.* 2013). Therefore, upon modifying the structure of either the anion or the cation, one can tune the size of the NPs (S. Campbell *et al.* 2013).

The aim of this work is to prepare metallic Co NPs with a narrow size distribution through the reduction of Co(COD)(COE) into metallic Co under H_2 using ILs as a solvent and stabilizing medium. NPs size is tuned by varying the experimental conditions or the IL nature (Figure 1). This reduction reaction is favored because it affords only volatile organic by-products easily removed from IL under vacuum, Eq. 1. The mechanism of NPs formation will be discussed as well the full characterization and magnetic properties of the Co NPs.

$$Co(\eta^3 - C_8H_{13})(\eta^4 - C_8H_{12}) \xrightarrow{H_2} Co + 2\,C_8H_{16} \qquad Eq.1$$

Keywords: Cobalt nanoparticles, Ionic liquid, Organometallic precursor.

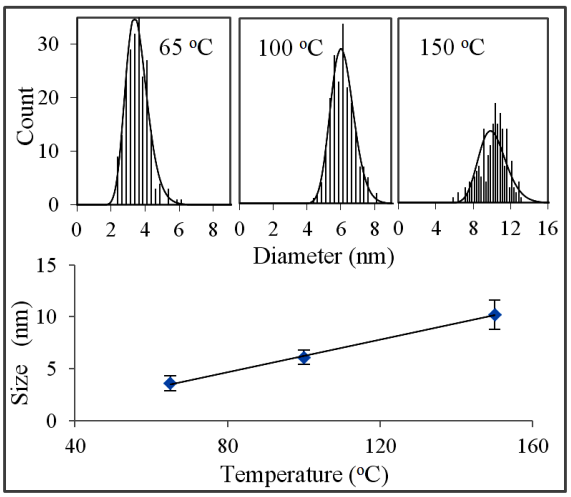


Figure 1: Histograms and size distribution of Co NPs determined from TEM images (200 particles measured) as a function of temperature. NPs were prepared by reduction of Co(COD)(COE) (0.05 M) in $C_1C_4Im\ NTf_2$ under 0.4 MPa H_2.

References:

Balzani, V. (2005) Nanoscience and Nanotechnology: A Personal View of a Chemist, *Small*, 1, (3) 278-283.

Chaudret, B., et al. (2007) Organometallic Nanoparticles of Metals or Metal Oxides, *Oil & Gas Science and Technology - Rev. IFP*, 62, (6) 799-817.

Comesana-Hermo, M., et al. (2014) Effect of a Side Reaction Involving Structural Changes of the Surfactants on the Shape Control of Cobalt Nanoparticles, *Langmuir*, 30, (15) 4474-4482.

Gutel, T., et al. (2009) Organized 3D-alkyl imidazolium ionic liquids could be used to control the size of in situ generated ruthenium nanoparticles?, *Journal of Materials Chemistry*, 19, (22) 3624-3631.

Meng, H., et al. (2012) Preparation of cobalt nanoparticles by direct current arc plasma evaporation method, *International Journal of Refractory Metals and Hard Materials*, 31, (0) 224-229.

S. Campbell, P., et al. (2013) Ruthenium Nanoparticles in Ionic Liquids - A Saga, *Current Organic Chemistry*, 17, (4) 414-429.

Vollmer, C., et al. (2011) Naked metal nanoparticles from metal carbonyls in ionic liquids: Easy synthesis and stabilization, *Coordination Chemistry Reviews*, 255, 2039-2057.

Intense visible emission from ZnO nanoparticles synthesized via co-precipitation and hydrolysis methods

Y. ZHU[1,*], A. APOSTOLUK[1], B. MASENELLI[1], P. GAUTIER[2], A. VALETTE[2], S. DANIELE[2]
[1]Université de Lyon, F-69000 Lyon, France and INL, CNRS, UMR 5270, INSA Lyon, Villeurbanne, France
[2]Université de Lyon, F-69000 Lyon, France and IRCE Lyon, CNRS, UMR 5256, F-69626 Villeurbanne France

Zinc oxide (ZnO) has a variety of intrinsic defects, thus it can provide a wide emission spectrum ranging from the blue to IR. The reported high yields of the defect luminescence of the ZnO in the visible [Tang *et al.*, 2010; Felbier *et al*., 2014] have stipulated the interest in the application of ZnO in the energy down-shifting systems and in the white light sources. Because of the fact that the synthesis conditions can be easily modified, two different sol-gel methods (co-precipitation and hydrolysis) at room temperature were used to synthesize ZnO nanoparticles (NPs). The nanoparticles were chosen as due to their high surface/volume ratio they are expected to possess an increased quantity of the defects emitting in the visible (like oxygen vacancies and zinc vacancies for example). We report the influence of different synthesis parameters (the nature of the solvent, the presence of additives or a surfactant and the reaction time) on the visible emission spectrum and the photoluminescence (PL) efficiency of the synthesized ZnO NPs. In particular, the LiOH addition in a non-polar solvent such as ethanol in the co-precipitation method and the polyacrylic acid (PAAH) at 0.63 wt % in the hydrolysis method play an important role in the enhancement of the visible emission efficiency, which can be as high as 20 %. However, the ZnO NPs obtained using the PAA are hardly dispersible in any solvent, which limits their future applications and the incorporation in the functional thin layers. Using the PAAH and PAANa in the hydrolysis method, dispersible ZnO NPs with the photoluminescent external quantum efficiency (EQE) of 25 % were obtained (by mixing the PAAH and PAANa at 50:50), when the reaction time was 1 hour. By extending the reaction time to 24 hours, the ZnO NPs with PAAH and PAANa grafted on their surface precipitate from the solution and their luminescent external quantum efficiency (EQE) is increased to more than 50 % and with time it can even rise up to over 70 %. In addition, the lengths of PAAH and PAANa chains and the ratio between the content of the PAAH and PAANa also influence the visible emission spectrum and the luminescent EQE of ZnO NPs. It is found that the highest visible luminescent EQE was obtained for the ratio of PAAH and PAANa of 50:50 and if at least one of them had a short chain length. When higher ratio of PAAH to PAANa or a longer length of the PAAH or PAANa chains was used, the emission spectrum of the ZnO NPs blue shifted from green-orange to the blue range and the luminescent EQE decreased. This study facilitates further exploration of new techniques to attain intense visible emissions from ZnO NPs and also paves the way for depositing the ZnO NPs thin layers by a simple and low-cost sol-gel method.

References:

Tang X. S., Choo E. S. G., Li L., Ding J., Xue J. M. (2010), Synthesis of ZnO Nanoparticles with Tunable Emission Colors and Their Cell Labeling Applications, Chem. Mater., 22, 3383-3388.

Felbier P., Yang J., Theis J., Liptak R. W., Wagner A., Lorke A., Bacher G., Kortshagen U. (2014), Highly Luminescent ZnO Quantum Dots Made in a Nonthermal Plasma, Adv. Funct. Mater., 24, 1988-1993

Influence of Processing Parameters on the Structure of Porous Metal Oxide – Cellulose Nanocomposites Prepared by Non-Solvent Induced Phase Separation

A.Wittmar,[1,2,*] M.Ulbricht,[1,2]
[1]Lehrstuhl für Technische Chemie II, Universität Duisburg-Essen, 45141 Essen, Germany
[2]NETZ – NanoEnergieTechnikZentrum, 47057 Duisburg, Germany
alexandra.wittmar@uni-due.de

Abstract: The preparation of metal oxide – cellulose nanocomposites with a predefined pore structure and homogenous dispersion of nanoparticles in the polymer matrix is still a challenge. The main reason is the poor solubility of cellulose in common solvents due to its strong intra- and intermolecular hydrogen bonding.
Several ionic liquids (IL), and especially the imidazolium based chlorides and acetates, due to their ability to break the hydrogen bonds, proved to be attractive candidates for cellulose solubilisation and processing. Additionally, many hydrophilic ionic liquids have been found to be very good media for the preparation of nanoparticle dispersions (Wittmar *et al.*; 2013, 2014). The downside of this approach is given by the high viscosity of the ionic liquids themselves, and, as consequence, the high viscosity of the resulting polymer solutions. This slows down dramatically the phase separation process, leading to polymer films with relatively low porosity.
The aim of the present work is to address advantages and disadvantages of several preparation routes for metal oxide – cellulose nanocomposites, using IL as cellulose solvents, and to clarify the relationships between the preparation method and the resulting pore structure and nanoparticle distribution. The focus of the study is on the influence of the processing parameters and especially on the possibilities to increase the solvent – nonsolvent exchange rate during the phase separation process.
The complex influence of the temperature at which the phase separation process takes place was evaluated for cellulose solutions in 1-butyl-3-methylimidazolium acetate, in absence and presence of a polar co-solvent with the role to decrease casting solution viscosity. Furthermore, the co-solvents influence on the nanoparticle dispersibility in polymer matrix was evaluated.
Temperature and co-solvent addition improve polymer solubilization and help controlling the phase separation by facilitating the mass transport.

Keywords: ionic liquids, non solvent induced phase separation, cellulose-based nanocomposites, porous nanocomposites

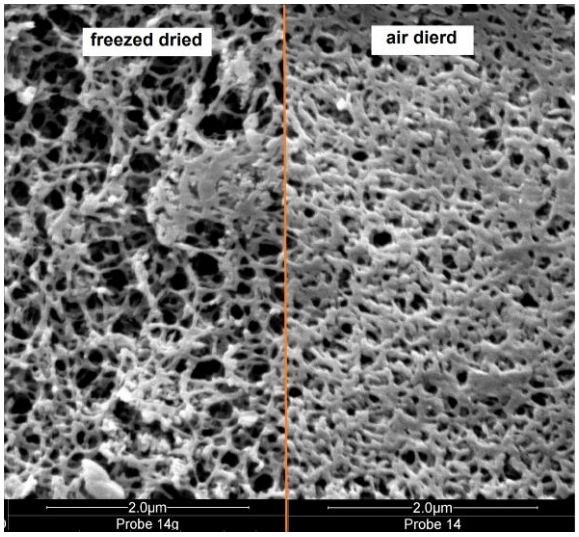


Figure 1: Electron microscopy images illustrating the important role played by the drying conditions onto the formation and consolidation of the porous structure of a cellulose acetate based nanocomposite prepared by phase separation from polymer solution in 1-buthyl-3- methylimidazolium acetate

References:

Wittmar A, Gajda M, Gautam D, Dörfler U, Winterer M, Ulbricht M, (2013) Influence of the cation alkyl chain length of the imidazolium-based room temperature ionic liquids on the dispersibility of TiO_2 nanopowders, *J. Nanopart. Res.* 15: 1463 - 1475

Wittmar A, Gautam D, Schilling C, Dörfler U, Meyer-Zayka W, Winterer M, Ulbricht M, (2014) Stable zinc oxide nanoparticles dispersions in ionic liquids, *J. Nanopart. Res.* 16: 2341 - 2355

Ultra-fast and controlled synthesis of Au-Iron Oxide hybrid nanocomposites using microfluidics

A.Larrea,[1*] V.Sebastian,[1,2] M.Arruebo[1,2], J.Santamaria[1,2]
[1] Department of Chemical Engineering. Institute of Nanoscience of Aragon (INA), University of Zaragoza, Zaragoza, Spain
[2] Research Center on Bioengineering, Biomaterials and Nanomedicine, CIBER-BBN, Madrid, Spain

Abstract: In recent years the production of nanocomposites involving magnetic and metallic elements has attracted much interest because of their potential applications such as drug delivery, tissue engineering, magnetic resonance imaging (MRI), cancer therapy, nanodiagnostics and catalysis (Sebastian et al., 2013).
Iron oxide nanoparticles are one of the magnetic nanoparticles widely used for biomedical applications, because of their low toxicity, chemical stability and biocompatibility (Calatayud *et al*., 2013). Moreover, the anchoring of gold nanoparticles to the surface of the iron oxide, improve their stability and increase their functionality, therefore the range of applications in which they can be used.
Precise control over the synthesis conditions and surface functionalization of magnetic nanoparticles is crucial because it governs their physicochemical properties, their colloidal stability and their biological behavior affecting their futures applications (Reddy *et al*., 2012).
Microfluidic systems are a powerful high-throughput tool to study and optimize a wide range of chemical reactions, and their use for the highly controlled nanoparticle synthesis have emerged in the last decade, offering multiple advantages over conventional synthesis method in which the reactor "batch" is used. These benefits include improvements in the crystallization process, good reproducibility and automation of the process. Laminar flow micro-reactors, however, are not enough suitable for the synthesis of nanoparticles with fast growth kinetics or where the presence of a specific reaction atmosphere is necessary. Segmented flow reactors are a good alternative, using an immiscible fluid (liquid or gas) to isolate the reagent segments. Key advantages of segmented flow include removing the dispersion, control of the reaction atmosphere and reduced reactor fouling (Nightingale *et al*., 2013).
We present a gas-liquid microreactor device as a powerful tool to fast synthesis of Au/iron oxide hybrid nanocomposites by controlling the reaction environment. We used a selected gas to form the iron oxide nanoparticles.Then, we have established a new approach to anchor the gold nanoparticles to the magnetic nanoparticles surface in a continuous fashion, a high yield and reproducible fabrication process. Pure and crystalline heterostructures (Au-Iron oxide nanoparticles), with magnetic and optic properties for use in biomedical and catalityc applications, were achieved in a time scale of 4 minutes. This reactor allows continuous flow and scale-up production keeping an excellent control over the synthesis.

Keywords: nanocomposites, magnetic nanoparticles, microfluidic reactors, segmented flow, continuous flow production, biomedical/catalityc applications.

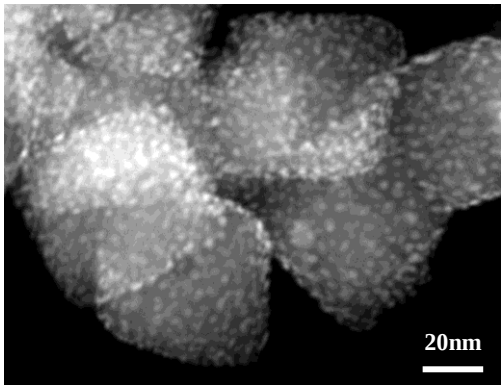


Figure 1: STEM-HAADF image of Au-Fe_3O_4 nanoparticles obtained using segmented flow microreactor

References:

Calatayud, M. P., Riggio, C., Raffa, V., Sanz, B., Torres, T. E., Ibarra, M. R., Goya, G. F. (2013). Neuronal cells loaded with PEI-coated Fe3O4 nanoparticles for magnetically guided nerve regeneration. *J.Mater. Chem. B*, *1*, 3607.

Nightingale, A. M., & Demello, J. C. (2013). Segmented flow reactors for nanocrystal synthesis. *Adv. Mater.*, *25*, 1813–21.

Reddy, L. H., Arias, J. L., Nicolas, J., & Couvreur, P. (2012). Magnetic nanoparticles: design and characterization, toxicity and biocompatibility, pharmaceutical and biomedical applications. *Chem. Rev.*, *112*, 5818–78.

Sebastian, V., Calatayud, M. P., Goya, G. F., & Santamaria, J. (2013). Magnetically-driven selective synthesis of Au clusters on Fe3O4 nanoparticles. *Chem. Commun*, *49*, 716–8.

Atmospheric Pressure Plasma for Nanomaterials : Production of Taylored Metal, Oxide and Polymer-coated nanoparticles by Discharge Filaments in Dielectric Barrier Discharges

J-P. Borra,[1*] N. Jidenko[1], J. Hou[2], A. Weber[2]
[1]*Laboratoire de Physique des Gaz et des Plasmas (CNRS –Université Paris Sud) F-91405*
Equipe Décharges Electriques et Aérosols, Supélec, France F-91192
[2]*Institute of Particle Technology, Technical University of Clausthal, Clausthal-Zellerfeld, Germany*

Abstract: This paper depicts a plasma process for the production of nano-particles in non-thermal atmospheric pressure. Such nanoparticles suspended in gases, also called aerosol with narrow size distribution are targeted for their size-dependant properties (Kodas and Hampden-Smith M. 1999).
Nucleated particles and subsequent 10-100nm agglomerates are produced in expanding vapors jets, usually produced by laser and spark discharges (1-100 mJ Gamaly, 2011 and Itina 2013).
Methods to induce non-thermal atmospheric pressure plasma filaments with lower energy per filament in (DBD 0.1-10µJ) are presented, in planar Dielectric Barrier Discharges with one or both electrodes covered by dielectric materials (alumina and polymers).
It is confirmed that the initial local vapor flux emitted from spots of interaction between plasma filaments and surfaces of different materials (Al_2O_3, Au, Ag, and Cu, Si, polymers) are reduced. Smaller primary particle density limits the local coagulation in the vapor plume (Borra et al.; 2015).Amorphous and crystalline pure metal primary nanoparticles with diameters below 5 nm are shown on Figure 1. Small agglomerates with diameters still below 5 nm are formed by agglomeration of these primary particles. Agglomeration happens at the end of the vapor jet expansion, as well as after the production during the transit between subsequent filaments in the DBD. The first step can be limited at reduced energy per filament by lowering the local vapor flux, while the second one depends on the transit time in the DBD.
Hence, such "low" energy plasma filaments (up to tens of µJ) efficiently lower the initial vapor flux to control the agglomeration. DBD were successfully tested for the production of tailored nanoparticles with tunable size and the same composition than the metal electrode. Similar results will be shown for oxides and polymer nanoparticles in bi-DBD.
Aerosol properties depend on the energy per filament and on materials properties. The energy yield of production (mol/J) is related to the inverse of melting enthalpies. The final size is controlled by plasma parameters and transit time in the DBD.
Hence, such plasmas can be used for the production of tailored particles with tunable size, composition and structure by plasma filaments to control the resulting properties of nano-powders and materials.

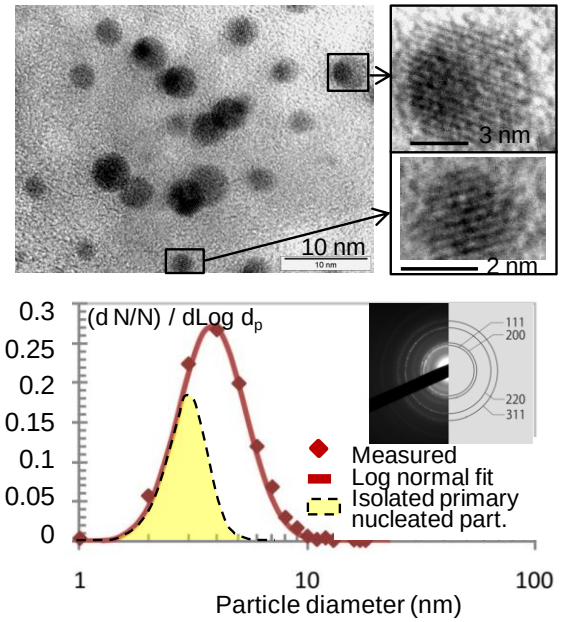


Figure 1: TEM micrograph, size distribution of gold particles (U_{pp}= 13 kV, g= 2.5 mm, transit time= 4 ms in N_2 Au-DBD with 1506 particles) with corresponding Small Angle Electron Difraction (SAED) figure of Au fcc crystalline structure.

This non-thermal plasma process may be used for nano-technologies, since it is performed at atmospheric pressure and can be used to reach size-dependant properties of nano-materials, without any precursor or solvent.

References:

Borra J.-P., et al (2015) Vaporization of metals into single-digit nanoparticles by non-thermal plasma filaments in DBD, *JAerosol Sc.*, **Vol. 79,** pp 109-125
Gamaly G.E. (2011) The physics of ultra-short laser interaction with solids, *Physics Reports* **508,** 91–243
Itina T.E., Voloshko A. (2013). Nanoparticle formation by laser ablation and spark discharges, *Appl. Phys B*, doi 10.1007//s00340-013-5490-6
Kodas T.T.& Hampden-Smith M.*Aerosol Processing of Materials* (New York: Wiley-VCH) (1999).

Nanolithography using thermal scanning probes

Stefan M. Weber
SwissLitho AG, Technoparkstrasse 1, CH-8005 Zurich, Switzerland

Abstract: We present a novel alternative to E-beam lithography in order to manufacture nanophotonic and nanoelectronic devices. The core of thermal scanning probe nanolithography (t-SPL) [1] is a heatable probe tip which is used for patterning and simultaneous inspection of nanostructures. The tip creates arbitrary, high-resolution nanostructures by local decomposition and evaporation of special resist materials. t-SPL is attractive due to the fact that no development and additional inspection steps are necessary in order to write nanostructures at 10 nm hp and even below. The direct 3D-writing capabilities that go beyond E-beam lithography use a closed-loop lithography scheme to reach a vertical resolution below 2 nm.

Since the proof-of-principle demonstrations of t-SPL in 2010 by IBM Research Zurich [2], the technology has seen tremendous progress. The breakthrough in patterning speed to match high-resolution Gaussian-beam E-beam lithography came in 2011 with patterning speeds up to 20 mm/s using only a single heated tip using resists like polyphthalaldehyde (PPA) [3]. In 2012, the high-speed imaging, in combination with the natural surface roughness of the polymer resist, was used to demonstrate position determination for stitching with 1 nm accuracy [4]. In 2014, a novel scheme employing the in-situ imaging and the detection of buried structures under the resist showed to be suitable for field overlays below 5 nm without the use of dedicated markers [5]. Compatibility with standard pattern transfer processes, like reactive ion etching, electroplating, or lift-off with a low line-edge roughness, and a resolution below 20 nm half-pitch [6] into semiconductors and metals has been recently demonstrated. Today, the first dedicated lithography systems for rapid prototyping applications based on this technology have been installed at universities in Europe and America by SwissLitho AG, a spin-off from ETH Zurich.

t-SPL also enables new possibilities for applications, e.g. for the fabrication of improved optical microcavities, or to create precisely defined Gaussian-shaped deformations in DBR mirrors where a strong lateral confinement while maintaining a cavity-Q of 10^5 is required [7]. Furthermore, the 3D-capabilities have been used to fabricate removable, 3D shape-matching traps for directed self-assembly, and the alignment and arbitrary placement of 25 nm x 80 nm-sized gold nanorods with 10 nm accuracy [8].

Thermal scanning probe nanolithography technology opens new possibilities for novel plasmonic-, nanophotonic- and nanoelectronic devices, in particular, where the accuracy of the distance between different functional parts of a device is crucial.

Keywords: 3D nanolithography, thermal scanning probe lithography, closed-loop lithography, pattern transfer, nanophotonics, plasmonics, nano-optics, micro-cavities, DBR mirrors, gold nanorods.

References:

[1] Garcia, R., Knoll, A. W., & Riedo, E. (2014) Advanced scanning probe lithography. *Nature nanotechnology*, 9(8), 577-587.

[2] Pires, D., et al., (2010). Nanoscale three-dimensional patterning of molecular resists by scanning probes. *Science*, *328*(5979), 732-735.

[3] Paul, P., et al., (2011). Rapid turnaround scanning probe nanolithography. *Nanotechnology*, 22(27), 275306.

[4] Paul, P., et al., (2012). Field stitching in thermal probe lithography by means of surface roughness correlation. *Nanotechnology*, *23*(38), 385307.

[5] Rawlings, C., et al., (2014). Nanometer control of the markerless overlay process using thermal scanning probe lithography. In *Advanced Intelligent Mechatronics (AIM), 2014 IEEE/ASME International Conference on* (pp. 1670-1675). IEEE.

[6] Wolf, H., et al., (2015). Sub-20 nm silicon patterning and metal lift-off using thermal scanning probe lithography. *Journal of Vacuum Science & Technology B*, *33*(2), 02B102.

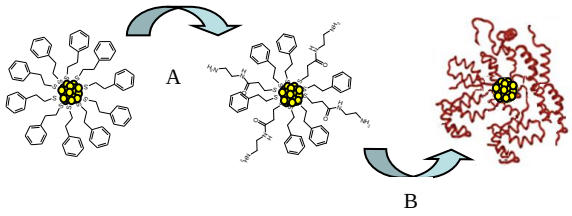
[7] Ding, F., Stöferle, T., Mai, L., Knoll, A., & Mahrt, R. F. (2013). Vertical microcavities with high Q and strong lateral mode confinement. *Physical Review B*, *87*(16), 161116.

[8] Holzner, F., et al., (2011). Directed placement of gold nanorods using a removable template for guided assembly. *Nano letters*, *11*(9), 3957-3962.

A novel method for the preparation of poly(aminoacid) capped ultrasmall gold nanoclusters

I. Guryanov,[1,2,*] F. Polo,[3] S. Antonello,[3] F. Maran,[3] E. V. Ubyivovk,[4] E. Vlakh,[1,2] T. Tennikova,[1,2]
[1]St.-Petersburg State University, Laboratory of Biomedical Chemistry, St.-Petersburg, Russia
[2]Institute of Macromolecular Compounds RAS, St.-Petersburg, Russia
[3]University of Padova, Padova, Italy
[4]St.-Petersburg State University, Department of Physics, St.-Petersburg, Russia

Abstract: Nanoparticles (NPs) have an enormous potential for the construction and study of systems suitable for molecular recognition and self-assembly at the nanoscale. This is particularly true for possible applications in biomedicine, such as tissue engineering (Korzhikiov *et al.*; 2011), drug delivery (Becucci *et al.*; 2014), and medical diagnostics (Chikkaveeraiah *et al.*; 2012). In this contest, hybrid core/shell nanosystems based on gold nanoclusters capped with poly(aminoacids) could be particularly useful owing to their relatively easy preparation and functionalization, and the possibility of displaying bioactive molecular moieties in a controlled manner (Perego et al.; 2013). We have recently found that ultrasmall (1-1.6 nm) monolayer-protected Au_{144} nanoclusters (MPCs) easily undergo cellular uptake, show no toxicity, and once loaded with drugs display excellent properties as drug carriers (unpublished results). In this work we explored a novel method for assembling functionalized polymers on Au_{144} MPCs. The method consists in the direct polymerization of N-carboxyanhydrides using these MPCs as both supports and initiators of polymerization in order to create core/shell star-like platform as possible nanocarrier for different bioactive molecules (Scheme 1). To prepare gold nanoclusters containing free amino groups suitable to act as polymerization sites, the monolayer of preformed phenylethanethiolate-coated MPCs was modified via ligand place exchange using thiolated ligands carrying a Fmoc-protected amino-group. The number of exchanged ligands was calculated using NMR analysis. The so-obtained mixed monolayer gold nanoclusters were FMOC-deprotected and fully characterized by TEM, TGA, UV and electrochemistry, allowing us to verify that the gold core size was not affected by the above chemical steps. This communication will aslo describe the results obtained for the subsequent polymerization of N-carboxyanhydrides on the modified gold nanoclusters. The focus will be on the composition, structure, dispersity and stability of the so-prepared core/shell star-like nanostructures, as a function of the monomer to initiator ratio and the reaction temperature.



Scheme 1: Synthesis of core/shell star-like nanoparticles. (A) Ligand exchange reaction and preparation of the initiator of polymerization. (B) N-carboxyanhydride polymerization and polymer deprotection.

Keywords: gold nanoclusters, poly(aminoacids), N-carboxyanhydride, core/shell nanoparticles, biomaterials, polymerization, ligand exchange reaction, biomedical applications

References:

Korzhikov, V. A., Vlakh, E. G., Kasper, C., Tennikova, T. B. (2011) In vitro modeling of cell–scaffold interaction. *Rus. J. Bioorg. Chem.*, 37, 270–276

Becucci, L., Polo, F., Guidelli, R., Maran, F. (2014) Interaction of mixed-ligand monolayer-protected Au_{144} clusters with biomimetic membranes as a function of the transmembrane potential, *Langmuir*, 30, 8141-8151.

Chikkaveeraiah, B. V., Soldà, A., Choudhary, D., Maran, F., Rusling, J. F. (2012) Ultrasensitive nanostructured immunosensor for stem and carcinoma cell pluripotency gatekeeper protein NANOG, *Nanomedicine*, 7, 957-965.

Perego, D., Masciocchi, N., Guagliardi, A., Domìnguez-Vera, H. M., Gálvez, N. (2013) Poly(amino acid) functionalized maghemite and gold nanoparticles. *Nanotechnol.* 24, 075102

First-principles calculations of two BN plus two C stripes $B_xC_yN_z$ selected nanotubes

E. Ribas,[1] M. J. Piotrowski,[1] A. C. M Carvalho,[2] M. Machado[1*]
[1]Universidade Federal de Pelotas, Rio Grande do Sul, Brazil
[2]Universidade Federal de São Joal del Rei, Minas Gerais, Brazil

Abstract: Carbon boron nitride ($B_xC_yN_z$) nanotubes are realistic materials which are expected to present interesting properties associated with their stoichiometry, chirality, diameter, and atomic arrangement (Golberg *et al*., 2002). It is known that BCN nanotubes, with C and BN stripes parallel to the nanotube axis, possess high stability and that segregation of BN and C parts is favored (Zhang *et al.*, 2009; An *et al.* 2010). Finally, the different strain energies of the curved C and BN arcs in the nanotubes with parallely aligned stripes can generate ellipsoidal nanotubes (Machado *et al*., 2011). We report structural, energetic and electronic properties, via first-principles calculations, of armchair and zigzag BC_8N, BC_3N, $B_3C_4N_3$, and B_2CN_2 nanotubes composed by two diametrically opposed BN and C stripes. The eccentricity (*e*) was calculated for all studied systems and two different pattern were observed: distance between opposite C walls is (i) smaller or (ii) larger than the distance between opposite BN walls after geometric optimization. Higher *e* values (up to 0.52) were observed for the zigzag nanotubes, and this effect was attributed to the geometry of the nanotube and a so called *hinge* effect (Figure 1). Regarding the nanotubes stability, the order of importance was established as following: stoichiometry, number and type of chemical bonds, diameter, and cross section deformation. The band structure calculations revealed an energy gap ranging from zero to 1.2 eV. Projected density of states (PDOS) analysis have shown major contribution of C and N atoms at the highest occupied molecular orbital (HOMO) and C and B atoms at the lowest unoccupied molecular orbital (LUMO) for all systems. Finally, the local density of states (LDOS) calculations have shown that the HOMO (LUMO) for the armchair nanotubes is due to C atoms directly bonded to B (N) ones. On the other hand, for the armchair tubes, a diameter/stoichiometry dependence was observed. We understand that this study provides a better knowledge of this type of nanotubes. Also, new geometry configurations can be thought based on the alterations in the cross section of nanotubes, like triangular or squared shaped systems.

Keywords: carbon boron nitride, nanotubes, nanotechnology, first-principles calculations, cross section alteration.

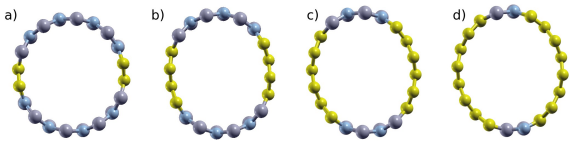


Figure 1: Pictorial scheme representing zigzag (10,0) nanotubes and the observed cross section alterations. The following stoichiometries are represented: a) B_2CN_2, b) $B_3C_4N_3$, c) BC_3N, and d) BC_8N.

References:

An., W., Turner, C. H. (2010) Linking Carbon and Boron-Nitride Nanotubes: Heterojunction Energetics and Band Gap Tuning, J. Phys. Chem. Lett. 1, 2269-2273.

Golberg, D., Dorozhkin, P., Bando, Hasegawa, M., Dong, Z.-C (2002) Semiconducting B-C-N nanotubes with few layers, Chem. Phys. Lett., 359, 220-228.

Machado, M., Kar, T., Piquini, P. (2011) The influence of the stacking orientation of C and BN stripes in the structure, energetics, and
electronic properties of BC_2N nanotubes, Nanotechnology 22, 205706-205714.

Zhang, Z-Y., Zhang, Z., Guo, W. (2009) Stability and Electronic Properties of a Novel C-BN Heteronanotube from First-Principles Calculations, J. Phys. Chem. C 113, 13108-13114.

Control of inter (bi)metallic nanoparticular distances

F. Kameche[1,2*], A. Six[3,4], A.-T. Ngo[1,2], D. Kreher[3,4], F. Mathevet[3,4], A-J Attias[3,4], Caroline Salzemann, F. Charra[5], C. Petit[1,2]

[1] Sorbonne Universités, UPMC Univ Paris 06, UMR 8233, MONARIS, F-75005, Paris, France
[2] CNRS, UMR 8233, MONARIS, F-75005, Paris, France
[3] Sorbonne Universités, UPMC Univ Paris 06, UMR 8232, IPCM, F-75005, Paris, France
[4] CNRS, UMR 8232, IPCM, F-75005, Paris, France
[5] CEA/DSM/IRAMIS/SPEC, Centre de Saclay, F-91191 Gif-sur-Yvette Cedex, France

Abstract: Controlling the implementation of inorganic nanocrystals in bidimensionnal lattices, more particulary by controlling the distance between the nanoobjects is a real and present challenge in differents fields. For example, if magnetic nanoparticles are too close, we cannot change the magnetic moment of one nanoparticle but only a group of nanoparticle. With the high interest of nanoparticles developped during years, the chemical synthesis of nanoparticles is well known and well controlled. However, when deposited on a substrate, the interparticle distance are only directed by the surfactant. On the other hand, organic molecules can self-assemble on substrate like Highly Oriented Pyrollitic Graphite (HOPG) leading to 2D supramolecular networks (Bléger et al., 2007). If nanoporous networks are formed, they can be used at molecular sieves to trap guest molecules (Schull et al., 2006). Extending this results to trap nanoparticles is a good solution to have a real control of the nanocrystals organization.

Here, we first report the different ways to synthesize Pt and CoPt nanoparticles with a good control of size, shape and composition (Wikander et al.,2006; Demortière et Petit, 2007). These two materials are good candidates for catalytic applications. Moreover, CoPt is also known to possess magnetic properties (Demortière et Petit, 2007). Second, by using two kinds of organic matrices self-assembling into hexagonal or linear lattices we are able to fill nanopores with nanocrystals via simple drop casting.. and to control the type of 2D organization. Various microscopy techniques (electronic and scanning probe microscopy) have been used to characterize the nanoparticles and the self-assemblies,

Keywords: (Co)Pt nanoparticles, polyol synthesis, liquid-liquid phase transfert synthesis, self assembly at surfaces, TEM, SEM, STM, drop casting.

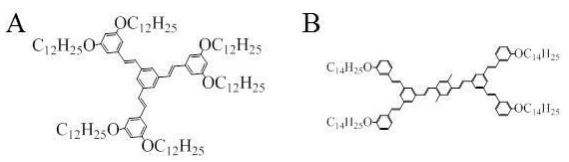


Figure 1: Molecule of (A) Tristilbene-3,5-C_{12} (TSB-3,5-C_{12}) and (B) 2C-C_{14}

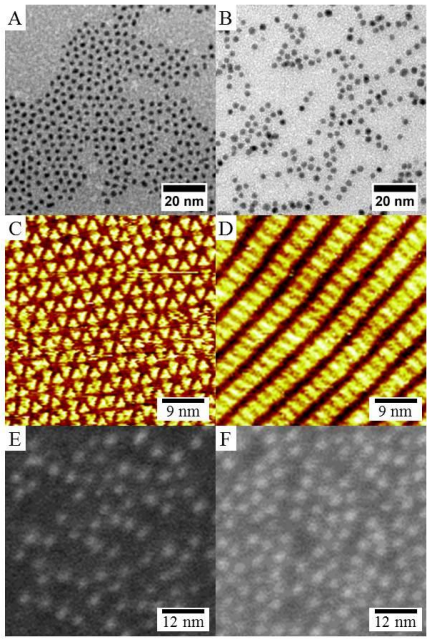


Figure 2: TEM images of platinum nanoparticles (A) and CoPt (B) synthesized via respectively liquid-liquid phase transfert and polyol process; . STM images of the self assembly on HOPG of (C) TSB-3,5-C_{12} and (D) 2C-C_{14}.SEM images of Pt nanoparticles deposited on HOPG (E) without and (F) with 2C-C_{14}.

References:

Schull, G., Douillard, L., Fiorini-Debuisschert, C., Charra, F., Mathevet, F., Kreher, D., Attias, A.-J. (2006), Single-Molecule Dynamics in a Self-Assembled 2D Molecular Sieve, *Nano Letters*, vol. 6, 1360-1363.

Wikander, K., Petit, C., Holmberg, K., Pileni, M.-P. (2006), Size Control and Growth Process of Alkylamine-Stabilized Platinum Nanocrystals: A Comparison between the Phase Transfer and Reverse Micelles Methods, *Langmuir*, 22, 4863-4868.

Demortière, A., Petit; C. (2007), First Synthesis by Liquid-Liquid Phase Transfer of Magnetic Co_xPt_{100-x} Nanoalloys, *Langmuir*, 23, 8575-8584.

Bléger, D., Kreher, D., Mathevet, F., Attias, A.-J., Schull, G., Huard, A., Douillard, L., Fiorini-Debuisschert, C., Charra, F. (2007) Surface Noncovalent Bonding for Rational Design of Hierarchical Molecular Self-Assemblies, Angew. Chem. Int. Ed., 46, 7404-7407

One pot microwave assisted synthesis of bisphosphonate alkene capped gold nanoparticles

Romain Aufaure,[1] Yoann Lalatonne,[1,2,*] Nicole Lièvre,[3] Olivier Heintz,[4] Laurence Motte[1] and Erwann Guénin[1,*]
[1]Université Paris 13, Sorbonne Paris Cité, Laboratoire CSPBAT, CNRS (UMR 7244), 74 avenue M. Cachin, 93017 Bobigny, France
[2]Department of Nuclear Medecine, Avicenne Hospital, Université Paris 13, Sorbonne Paris Cité, 125 rue de Stalingrad, 93009 Bobigny, France
[3]Université Paris 13, Sorbonne Paris Cité, UPRES 3410 Biothérapies Bénéfices et Risques, CNRS (UMR 7244), 74 avenue M. Cachin, 93017 Bobigny, France
[4]Université de Bourgogne, Laboratoire Interdisciplinaire Carnot de Bourgogne, CNRS (UMR 5209), 9 Avenue Alain Savary, BP 47870, 21078 Dijon Cedex, France

Abstract: Gold nanoparticles (GNPs) have proven to be a versatile platform for a large scope of applications, with potential use in numerous areas including: catalysis, optics and biology. Since the Turkevich study of 1951, the citrate capped GNPs are commonly used for a post functionalization by ligand exchange. Several molecules have been tested to replace citrate as reducing agent and stabilizer for one pot synthesis: carboxylic acids, amines, polysaccharides, thiophene derivatives and polymers.

Our project aims to develop new synthetic pathways for the direct synthesis of GNPs allowing easy access to functionalization. This is achieved by using synthesized (1-hydroxy-1-phosphonopent-4-enyl)phosphonic acid, presenting advantages of the well known bisphosphonate coating applied to colloidal gold instead of metal oxides (Figure 1). This molecules is bifunctional: Phosphonate group is able to both reduce gold(III) chloride and to coat the surface of the obtained GNPs. The terminal alkene group will remain inert during the NPs synthesis and will allow further chemoselective GNPs functionalization.

We have demonstrated the overall reaction mechanism and the interaction between our bisphosphonate compound and the gold surface by classical analytical chemistry techniques. Optimization of reaction pH has been assessed to yield homogeneous nanospheres of size ranging from 13-20 nm. Then reactions at the surface with the terminal alkene group have been characterized, confirming their chemoselective reactivity.

These new GNPs are also used as a building block for sized controlled covalent assemblies' preparation. The controlled size assemblies are water soluble and present specific optical properties shifting from blue to NIR absorption yielding to promising in vivo applications such as imaging probe and hyperthermia. We have also used similar phosphonated compound in a very recent work for hybrid nanostructures synthesis in aqueous media, enlarging the scope of applications.

Keywords: Gold nanoparticles, microwave, bisphosphonate, surface functionalization.

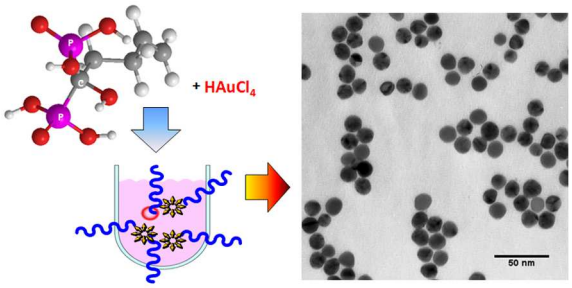


Figure 1: Microwave assisted synthesis of functionalized gold nanospheres.

Reference:

Aufaure, R., Lalatonne, Y., Lièvre, N., Heintz, O., Motte, L., Guénin, E. (2014), One pot microwave assisted synthesis of bisphosphonate alkene capped gold nanoparticles, *RSC Adv.*, 4, 59315

Novel Nano Rods of N-nicotinyl,N′,N″-bis(hexamethylenyl)Phosphorictriamide

Nasrin Oroujzadeh[1,*], Elham Delpazir[1]

[1]Institute of Chemical Technology, Iranian Research Organization for Science and Technology (IROST), Tehran, Iran

Abstract: Phosphoramides including -C(O)N(H)P(O)- moiety have received considerable attention due to their unique properties like anti-HIV, anti-HCV, antibacterial and anticancer drugs (Mehellou *et al*.; 2007). Nicotinamide, which is essential for the human body, plays a crucial role in biological oxidative chemistry (Mazzini *et al*.; 1995), (Magel *et al*.; 2001). With respect to the important properties and applications of phosphoramides and nicotinamide, we focused on phosphoramide compounds containing nicotinamide substituent group.

In this work, by using ultrasonic waves, nano particles (rods) of a new phosphoric triamide compound with formula $C_5H_5NC(O)NHP(O)(NC_6H_{12})_2$ were successfully synthesized (Figure1). After reaction between PCl_5 and nicotinamide and then one step oxidation, the product was reacted with proper amount of hexamethyleneimine in ultrasonic bath for 3 hours and then purified with solvent washing method. After that, the final purified product was fully characterized by SEM, (^1H, ^{13}C, ^{31}P) NMR, FT-IR and elemental analysis.

We expect this compound to show better biological activities than each of its ingredients. In addition, since nano scale materials have stronger and better properties due to their smaller size, we expect these new synthesized nano particles to show better biological and pharmacological activities in comparison to their macro size analogues; this subject is now under investigation with our team.

Keywords: Nano particles, Ultrasonic, Phosphoramide, Nicotinamide, Hexamethyleneimine.

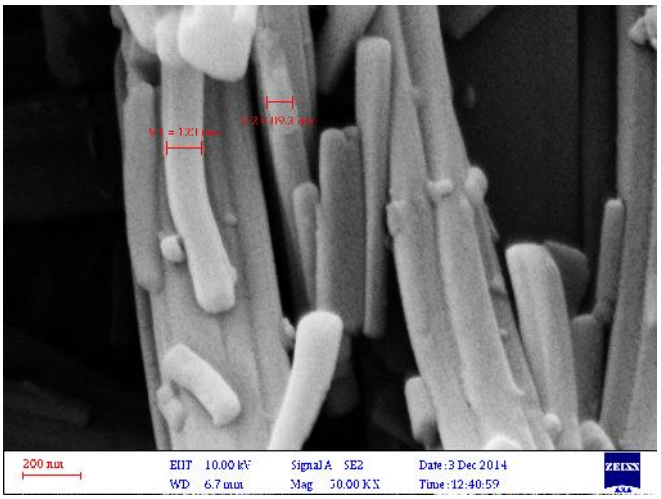


Figure 1: Morphology of the synthesized nano particles from SEM

References:

Magel, E.A., Hillinger, C., Wagner, T., Holl, W.(2001), Oxidative pentose phosphate pathway and pyridine nucleotides in relation to heartwood formation in Robinia pseudoacacia L , *Phytochem*, 57, 1061.

Mehellou, Y., McGuigan, C., Brancale, A., Balzarini, J. (2007), Design, synthesis, and anti-HIV activity of 2',3'-didehydro-2',3'-dideoxyuridine (d4U), 2',3'-dideoxyuridine (ddU) phosphoramidate "ProTide' derivatives, *Bioorg. Med. Chem. Lett.* 17, 3666.

Mazzini, S., Monderelli, R., Ragg, E., Scaglioni, L. (1995), Design, synthesis, and anti-HIV activity of 2',3'-didehydro-2',3'-dideoxyuridine (d4U), 2',3'-dideoxyuridine (ddU) phosphoramidate, *J. Chem. Soc. Perkins Trans* 2, 285.

Cross-linked PAN-based thin-film composite membranes for non-aqueous nanofiltration

Liliana Pérez-Manríquez, Jamaliah Aburabi'e, Pradeep Neelakanda, Klaus-Viktor Peinemann

Advanced Membranes and Porous Materials Center, King Abdullah University of Science and Technology (KAUST), 23955-6900 Thuwal, Saudi Arabia

Abstract: In this work, we present a new approach for the development of cross-linked PAN based thin film composite (TFC) membranes for non-aqueous application with perspectives toward new applications in harsh solvent environments.

The manufacturing method is easy to scale up. Polypropylene backed neat PAN membranes were fabricated by phase inversion process and cross-linked with hydrazine hydrate to get excellent solvent stability toward dimethylformamide (DMF). By interfacial polymerization a selective polyamide active layer was coated over the cross-linked PAN using N,N'-diamino piperazine (DAP) and trimesoyl chloride (TMC) as monomers. Permeation and molecular weight cut off (MWCO) experiments using various dyes were done to evaluate the performance of the membranes which showed excellent solvent stability toward DMF with a permeance of 1.7 L/m^2 h bar and a molecular weight cut-off of less than 600 Da.

Keywords:

Non-aqueous nanofiltration, Interfacial polymerization, Cross-linked Polyacrylonitrile.

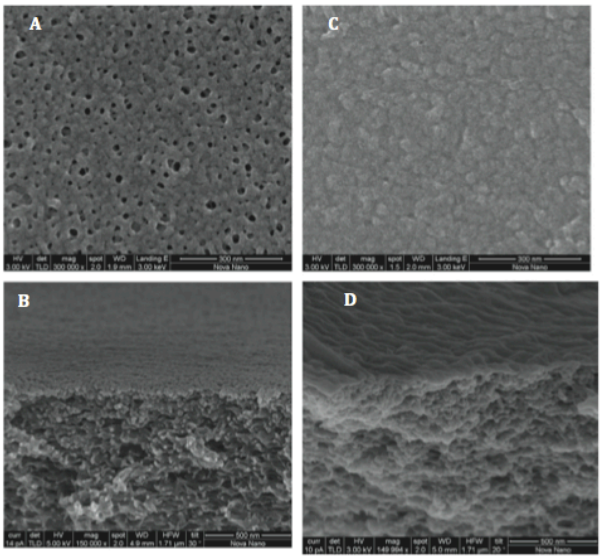


Figure 1. SEM pictures of surface and cross-section of the cross-linked PAN (A and B) and cross-linked PAN after surface modification with interfacial polymerization (C and D).

References:

Pérez-Manríquez,L;Aburabi'e,J; Neelakanda, P; Peinemann, K-V.Reactive & Functional Polymers 2014. doi:10.1016/j.reactfunctpolym.2014.09.015

Materials Aspects of AlSi + SiC Composites Foams Joining

J. Nowacki
Institute of Materials Science and Engineering
West Pomeranian University of Technology, Szczecin, Poland

Abstract: The cellular structure and unique properties of aluminum foams are the reason of their numerous applications and interests in respect of their joining (*Malekjafarian M. et al*.; 2012). The paper includes the characterization of the essence of microstructure, properties and application of aluminum and aluminum composite foams, the limitations, and possibilities of their joining. The aim of the research is the consideration of methods of welding, soldering and gluing AlSi foams and AlSi- SiC composite foams, and the joint structure. The possibility of joining AlSi9 foams and AlSi9-SiC composite foams using selected binding materials was confirmed, and higher tensile strength of the joint than the parent material was also ascertained. Preparing foam edges for joining requires that cutting products should be removed from its surfaces (Abolghasemi F. M. *et al*.; 2012). It is difficult on mickro and nano porous structures due to irregular shape of pores and limited access to them. Contrary to mechanical cleaning, chemical treatment yields satisfactory results. A varying size of soldering gap restricts uniform distribution of the solder and flux within the joint. The capillarity of the gap is much reduced or does not occur in the immediate vicinity of pores. In case of open pores, the flux penetrates into the foam, which means only a non-corrosive flux can be used. Foam porosity causes a substantial use of filler metal and flux as they escape deeper into the foam. Another essential restriction in Al foam soldering is lack of methodologies of testing the geometry of edges prepared for soldering, or that for testing mechanical properties. Besides, criteria for soldered joint acceptance are not available. Apart from problems resulting from foam structure, soldering aluminum is considered as a difficult process due to low melting point, high thermal conductivity and expansion, and a large shrinkage while aluminum cools down. A great affinity of aluminum for oxygen requires that aggressive fluxes be used to remove a layer of oxides Al_2O_3 from the specimen surface before soldering (Nowacki *et al*.; 2015). The process of Al foam flame brazing, due to non-uniform heating of macro-areas of a specimen, causes non-uniform distribution of brazing metal in the pores and foam structure strain due to partial melting of cell walls. This phenomenon does not occur in hot air soldering.

Keywords: Al foams joining, AlSi foams, microstructure and mechanical properties of AlSi foams joints, AlSi -SiC composite foams

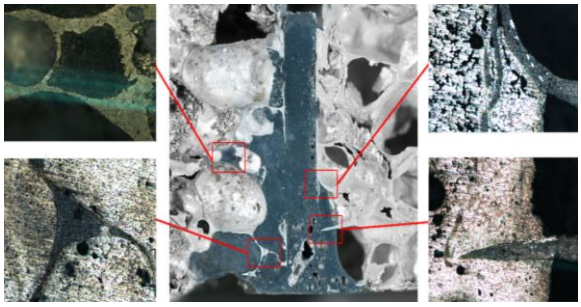


Figure 1: Al foam - Al foam brazed joint, Castolin FCW198 brazing metal, integrated macro- and micro- image

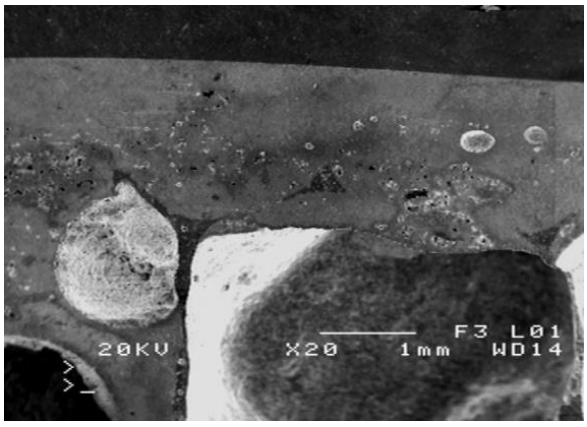


Figure 2: Al foam - Al sheet brazed joint, ZnAl22 brazing metal, macro- and micro- image. The microscopic image reveals melting and mixing of foam cell walls with filler metal and a visible pore not filled with liquid solder.

References:

Malekjafarian M., Sadrnezhaad S.K. (2012) Closed-cell Al alloy composite foams: Production and characterization, *Materials and Design* 42, 8–12

Abolghasemi F. M. Bordatchev E. V., Tutunea-Fatan O. R. (2012) An image-based methodology to establish correlations between porosity and cutting force in micromilling of porous titanium foams, *Int. J. Adv. Manuf. Technol*, 60, 841–851

Nowacki J. Moraniec K. (2015) Evaluation of Methods of Soldering AlSi and AlSi-SiC Particle Composite Al Foams, *J. of Materials Eng. and Perform*.
24, 426-433

Nanofunctionalization of alginate and alginate/GelMA crosslinked hydrogels by nanoliposomes and 3D construct

Rana Kadri[1], Bahar Aliakbarian[2,3], Laura Sanchez-Gonzalez[1], Ali Tamayol[2], Alireza Hassani Najafabadi[2], Ali Khademhosseini[2] and Elmira Arab-Tehrany[1,2]
Corresponding Author: elmira.arab-tehrany@univ-lorraine.fr
[1] Université de Lorraine, Laboratoire d'Ingénierie des Biomolécules, Nancy, France
[2] Center for Biomedical Engineering, Department of Medicine, Boston, USA
[3] Department of Civil, Chemical and Environmental Engineering (DICCA), University of Genoa, Via Opera Pia 15, 16145, Genova, Italy

Introduction

The hydrogels are 'soft' microscopic particles consisting of cross-linked polymeric molecules. They are valued for their functionality and ability to tune physical properties in industrial applications including controlled drug delivery, cosmetics, pharmaceuticals and tissue engineering. The overall goal of the proposed abstract is to functionalize the 3D hydrogel constructs from Alginate and GelMA by nano-liposome with and without active molecule (antioxidant).

Materials and Methods

The mixed solution of prepolymers was prepared in a way that the final alginate concentration was higher than 0.5% (w/v). The solution was directly injected in a beaker containing 2% $CaCl_2$ at a constant flow rate, where the fiber template was formed. A secondary crosslinking step was performed to create IPN fibers. The secondary crosslinking steps include UV exposure at 850 mW for GelMA, To functionalize the 3D hydrogel construct, the nanoliposome solution was prepared at 2% (w/w) marine lecithin with and without active molecule. The suspension was mixed for 4 h and then sonicated for 120 s (40 kHz, 40% of full power)[1]. 21,5 µl of prepared solution was added to hydrogels. The mechanical, biodegradability and morphological properties of functionalize and non-functionalize hydrogels were studied. We encapsulated the NIH 3T3 fibroblasts in this 3D scaffold and we functionalized this network by incorporation of nanoliposome. We assessed the viability of NIH 3T3 fibroblasts over time (7 days). All groups were made in triplicate (n=3).

Results

Figure 1a shows a morphological property of functionalized fiber fabricated from alginate:GelMA. The fiber was formed by wetspinning of the mixture in a $CaCl_2$ bath followed by 30 s UV illumination. We assessed the viability of NIH 3T3 fibroblasts during the fabrication process without nanoliposome (Fig. 1b). The results confirmed a high cellular viability after nanofunctionalization (Fig. 1c). The IPN fibers possess with nanoliposome has stronger mechanical characteristics in comparison to the hydrogel without nanoliposome. We showed by adding the nanoliposome from natural sources, the cells proliferation of NIH 3T3 increases.

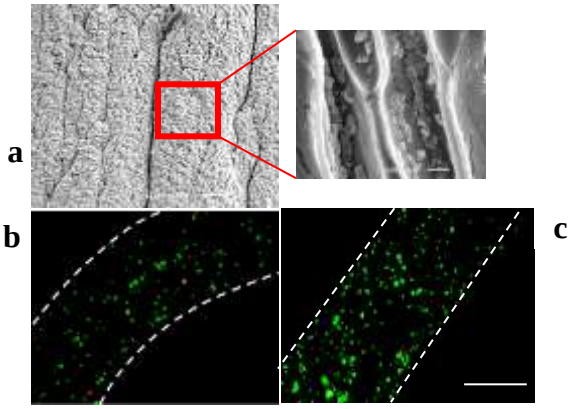


Fig. 1. (a) SEM images of 3D fiber; (b,c) cell viability during the fabrication process (green:live) with and without nanoliposome, respectively.

Discussion and Conclusions

A facile technique for fabricating hydrogel fibers is proposed which is compatible with a variety of hydrogels. The fabrication process does not affect cellular viability and activity. The presence of nano-soft particles (nanoliposome) from natural sources with and without active molecule improves the physico-chemical, mechanical and biological properties of 3D hydrogels.

References List references cited in text as

1. Arab Tehrany E., Kahn C. J.F., Baravian, C., Maherani B., Belhaj N., Wang X., Linder M. Colloids and Surfaces B. 95:75-81, 2012.

Session II - A: Nanomaterials Characterization and Tools

Simultaneous Topography and Electrochemical Imaging (SECM)

Gerald Kada[1], Shijie Wu[2], Christine Kranz[3]
[1]Keysight Technologies GmbH, Gruberstrasse 40, Linz, Austria
[2]Keysight Technologies Inc., 5301 Stevens Creek Blvd, Santa Clara, USA
[3]University of Ulm, Institute for Analytical Chemistry, Albert-Einstein-Allee 11, Ulm, Germany
gerald_kada@keysight.com

Abstract: Laterally resolved (electro)chemical information on a sample can be obtained with scanning electrochemical microscopy (SECM), where a biased ultra-microelectrode is scanned at a defined distance across the sample surface. However, conventional SECM suffers the lack of sufficient spatial resolution and the convolution of topography and electrochemical response due to the current-dependent positioning of the microelectrode.

Within the last decade several approaches have been reported, for directly integrating a micro- or nanoelectrode into an AFM probe. In order to maintain the functionality of both techniques, the integrated electrode is recessed from the end of the AFM tip. Consequently, the electrode is located at a defined distance to the sample surface, which is now defined by the length of the actual AFM tip. Thus, by applying a potential to this AFM-SECM probe and recording the Faradaic current related to electroactive surface processes, laterally resolved (electro)chemical information can be directly correlated to the topographical information obtained by the AFM measurement. So far, combining AFM with SECM required customized solutions, as no commercial SECM module for AFM systems was available and therefore the technology could only be used by a limited number of researchers.

Recently we have succeeded in bringing an SECM module onto a commercial AFM platform, providing a dedicated mount with integrated preamplifier for AFM-SECM probes and a bi-potentiostat, which allows to control the potential of the sample and the AFM tip-integrated electrode. This mechanism not only greatly minimizes the effort required for experimental setup, but also enables the capability of multifunctional imaging and surface modification with combined AFM-SECM modes. The advantage of the combined technique is that measurements are not limited to amperometry but can be extended to a multitude of electroanalytical techniques during AFM imaging. Several applications of this new SECM approach will be shown, starting from test structures up to redox-mediated membrane transport in cell membranes..

Keywords: scanning probe micoscopy, biosensors, electrochemistry, biorecognition

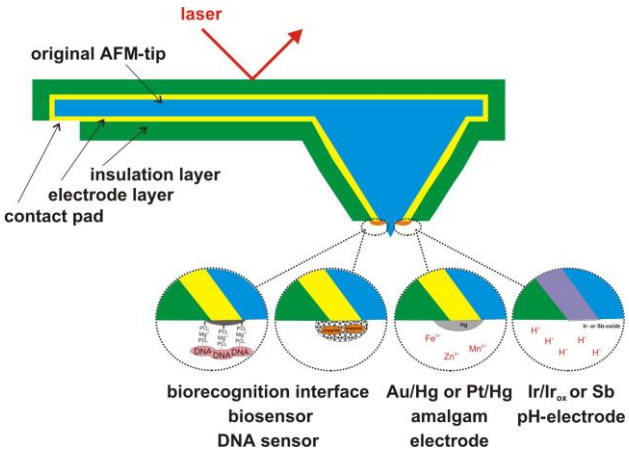


Figure 1: Applications of SECM using derivatized electrodes. Those electrodes can be modified with sensor layers or special electrode material for various nano-sensing opportunities in life science and material science.

References:

[1] C. Kranz, *Analyst*, **139** (2014) 336-352.
[2] J. V. Macpherson, P. R. Unwin, *Anal Chem*, **72** (2000), 276-285.
[3] C. Kranz, G. Friedbacher, B. Mizaikoff, A. Lugstein, J. Smoliner, E. Bertagnolli, *Anal Chem*, **73** (2001), 2491-2500.
[4] A. Kueng, C. Kranz, A. Lugstein, E. Bertagnolli, B. Mizaikoff, *Angew. Chem. Int. Ed*, **44** (2005), 3419-3422.
[5] C. Kranz, J. Wiedemair, *Anal Bioanal Chem*, **390** (2008), 239-243.
[6] S. Wu, *Keysight Technologies Datasheet* (2014), 5991-4525EN.

Copper nanoparticles: organization and stability

K. Ouadahi[1*], A. Courty[1]

[1]University of Pierre Marie Curie (UPMC), MONARIS laboratory, Paris, France

Abstract: Copper nanoparticles are of great interest because they are much cheaper than Ag or Au and they have very peculiar optical, electrical and thermal properties. Furthermore, nanosized Cu exhibits a prominent Localized Surface Plasmon Resonance (LSPR) in the visible range as Ag and Au. Nevertheless, a major drawback limiting the use of CuNPs is their tendency to oxidize. The literature on the synthesis of CuNPs of controlled size and shape is thus less developed than for Ag or AuNPs. In this context, we have developed a new synthetic route for spherical small copper nanoparticles (CuNPs) with size ranging from 3.5 nm to 11 nm and with an unprecedented associated monodispersity (<10%) (Courty *et al*. ; 2015). This synthesis is based on the reduction of an organometallic precursor ($CuCl(PPh_3)_3$) by ter-butylamine borane in presence of dodecylamine (DDA) at a moderate temperature (50 to 100°C). Because of their narrow size distribution, the CuNPs form long-range 2D and 3D organization at large scale. The wide range of CuNPs size is obtained by controlling the reaction temperature and DDA-to-copper phosphine salt ratio during the synthesis process (Figure 1). The addition of oleic acid (OA) after synthesis stabilizes the CuNPs (no coalescence) for several weeks under nitrogen atmosphere. We have studied their stability under air either in solution or after deposition on a solid substrate. We show that their organization induces greater stability against oxidation compared to the same nanocrystals when dispersed in solution. The present results are evidenced by transmission electron microscopy (TEM and HR-TEM), UV-Vis and IR spectroscopies and X-ray diffraction. The presentation focuses on the fabrication and the stability study of isolated or organized copper nanoparticles.

Keywords: copper nanoparticles, organization, optical properties.

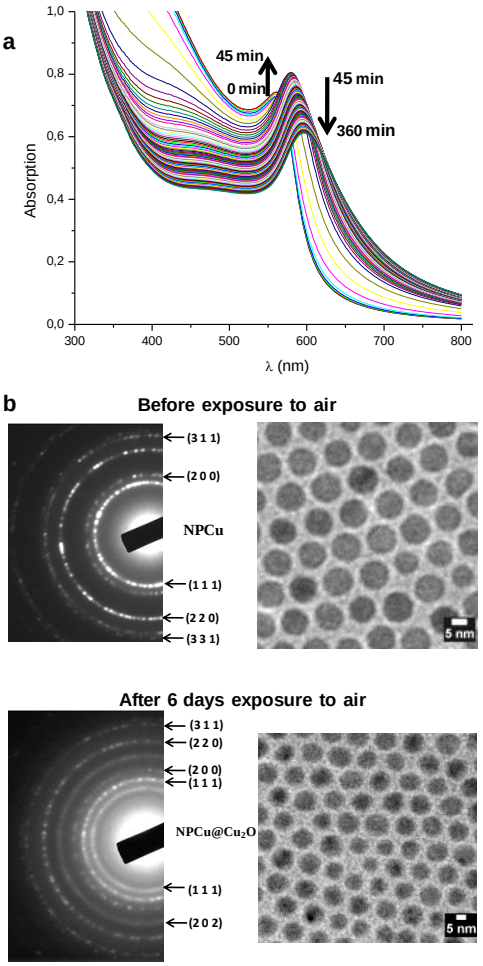


Figure 1: stability under air of copper nanoparticles: a) organized, b) isolated (dispersed in hexane)

References:

Ali Ben Aissa, M., Tremblay, B., Andrieux-Ledier, A., Maisonhaute, E., Raouafi, N., Courty, A., Copper nanoparticles of well-controlled size and shape: a new advance in synthesis and self-organization, *Nanoscale*, 2015, 7, 3189 – 3195.

Improved spectral imaging ellipsometry for nanoscale solid-liquid interface investigations

A. Miranda, P. A. A. De Beule
Applied Nano-Optics Laboratory, International Iberian Nanotechnology Laboratory, Braga, Portugal

Abstract: Ellipsometry is a widely applied technique for the characterization of thin films in nanotechnology (Azzam, 1977; Fujiwara 2005). We present an improved hardware design for spectroscopic imaging ellipsometry investigations at the liquid-solid interface (Figure 1) with vastly improved noise levels for ellipsometry angle determination (Figure 2). We achieve this by altering the illumination pathway of a commercial spectroscopic imaging ellipsometer (nanofilm_ep3_se – EP3, Accurion GmbH, Göttingen, Germany) consisting of a fibre coupled Xenon arc lamp ligh source with a customized white-light laser assembly comprising a supercontinuum fibre laser (EXB-6, NKT Photonics, Birkerod, Denmark) integrated with a multi-line diode laser system (IBeam Smart, Toptica Photonics, Gräfelfing, Germany) providing five laser lines between 350nm and 450nm. Further noise level reduction are obtained by the design of a new sample holder compatible with water dipping objectives (40x, CFI APO NIR, Nikon, Japan). We present and discuss newly obtained performance characteristics for spectroscopic imaging ellipsometry, whereby achieved noise level reductions allow for improved metrology of thin films at the solid-liquid interface. As an example, we apply our new set-up for the study of supported lipid bilayers.

Keywords: ellipsometry and polarimetry, thin films, optical constants, metrology.

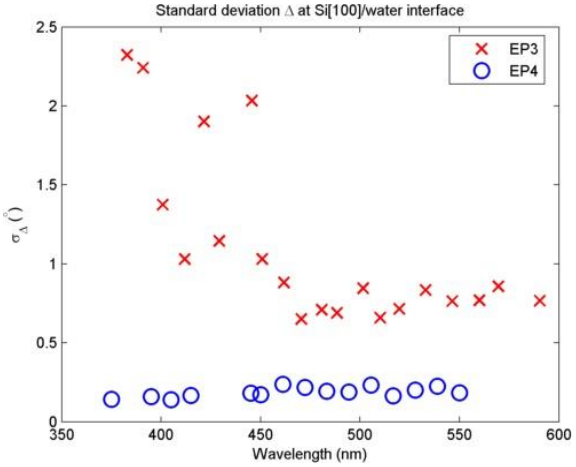


Figure 2: Standard deviation for ellipsometry Δ angle determination with spectroscopic imaging ellipsometry at a Si[100]/H_2O solid-liquid interface with a broadband Xe light source (EP3) and customized laser illumination system (EP4).

References:

Azzam, R. M. A., & Bashara, N. M. (1977). Ellipsometry and Polarizd Light. Amsterdam: *Elsevier Science Publishing Company, Inc*.

Fujiwara, H. (2005). Spectoscopic ellipsometry: principles and applications. Tokyo: *Maruzen Co. Ltd*

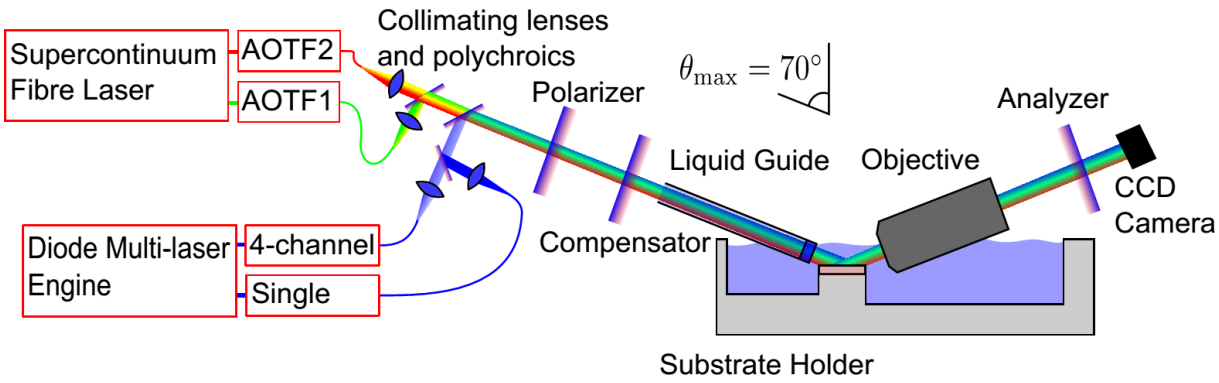


Figure 1: Spectroscopic imaging ellipsometry set-up (EP4) optimized for measurements at the solid-liquid interface.

Quantitative ellipsometric measurements of single micro-objects

D. Lyutov, S. Hadjiiski, G. Tsutsumanova, S. Russev
Department of Solid State Physics, Faculty of Physics, University of Sofia, 5 James Bourchier blvd., Sofia 1164, Bulgaria

Abstract: Ellipsometry is a well-known method for examination of bulk materials, solid state structures and thin films. It is very sensitive to the optical properties and structure of the sample in the direction normal to its surface. However, the conventional ellipsometry has low resolution in the sample surface plane. Several techniques can be used to improve the lateral resolution – focusing ellipsometry (Ye *et al.*, 2007), imaging ellipsometry (Asinovski *et al.*, 2008), scanning near field ellipsometry (Karageorgiev *et al.*, 2001). Although some of them allow quantitative measurements, their accuracy is lower than that of the conventional ellipsometry.

A technique for measurement of the ellipsometric angles of single micro-objects is presented. The experimental setup used allows only light reflected from the examined object to be detected. The sample is embedded in immersion oil and is sandwiched between a glass prism and a glass substrate (Figure 1). The influence of the diffraction effects on the optic response for micro-objects is addressed both theoretically and experimentally by means of comparison with macro objects with identical refractive index and thickness. The aim of this work is to demonstrate that ellipsometric measurements of micro-objects with accuracy comparable to that of the conventional ellipsometry are possible. Tests are made to estimate the repeatability, accuracy and the potential for local measurement of this ellipsometric configuration.

Keywords: ellipsometry, micro-objects, optical properties

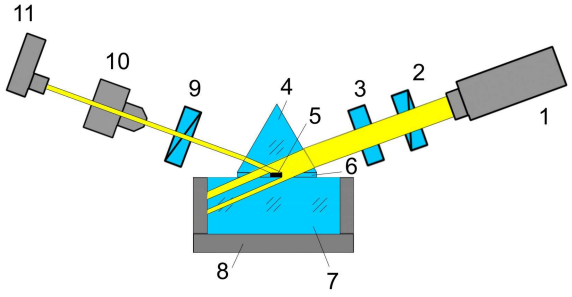


Figure 1: Scheme of the configuration of the ellipsometric device. 1- light source, 2 – polarizer, 3 – compensator, 4 – glass prism, 5 – examined micro-object, 6 – immersion oil, 7 – glass substrate, 8 – stage, 9 – analyzer, 10 – microscope optical system, 11 – photodetector

References:

Ye, S. H., Kwak, Y. K., Kim, S. H., Cho, H. M., Cho, Y. J., Chegal, W. (2007), Development of a focused-beam ellipsometer based on a new principle, *Aip Conf Proc*.931,69-73.

Asinovski, L., Beaglehole, D., Clarkson, M. T. (2008), Imaging ellipsometry: quantitative analysis, *Phys Status Solidi A*.205,4,764-771.

Karageorgiev, P., Orendi, H., Stiller, B., Brehmer, L. (2001), Scanning near-field ellipsometric microscope-imaging ellipsometry with a lateral resolution in nanometer range, *Appl Phys Lett*.79,11,1730-1732.

blueDrive™ photothermal excitation for fast, reliable and quantitative AFM

A. Labuda, J. P. Cleveland, N. Geisse, S. Hohlbauch, M. Kocun, R. Proksch,
I. Revenko, M. Viani, D.A. Walters.
Asylum Research, an Oxford Instruments Company, Santa Barbara, California, 93117.
aleks.labuda@oxinst.com

Since the advent of atomic force microscopy, cantilevers have predominantly been driven by piezo actuators for AC imaging and data acquisition. However, parasitic resonances of the AFM hardware, known as the "forest of peaks"[1], cause problems in all environments, ranging from viscous fluids[2], to water[3], air[4], and even vacuum[5].

AFM signals acquired with piezo-driven cantilevers reflect changes in the cantilever response *and* the piezo response. This reduces the accuracy of quantitative AFM studies, and may couple conservative and dissipative forces. Furthermore, it is well known that small high-frequency cantilevers enable faster AFM imaging; however, the forest of peaks prevents reliable cantilever tuning at high frequencies because piezo resonances tend to become more jagged and problematic as the drive frequency increases. The reliability of the AFM is also compromised because the forest of peaks changes with temperature and time, especially in liquids.

Photothermal excitation is a high frequency method for exciting a cantilever by heating/cooling the base of the cantilever. Photothermal excitation results in a repeatable and accurate cantilever transfer function that is time- and temperature-stable, resulting in stable imaging in liquids (see Figure) and dependable use for temperature-dependent studies. Because the driven transfer function represents the true cantilever transfer function, blueDrive ensures more accurate quantitative AFM experiments: the AFM signals stem from tip-sample interactions, rather than piezo resonances. Also, smaller cantilevers can be photothermally excited with large amplitudes for fast AFM imaging.

Our recent developments in perfecting photothermal excitation and its benefits to the AFM community will be discussed in this talk. To date, we have demonstrated reliable photothermal operation in air and fluid environments using a broad range of imaging techniques, such as AM-AFM (Tapping), FM-AFM, Contact Resonance, AMFM viscoelastic mapping.

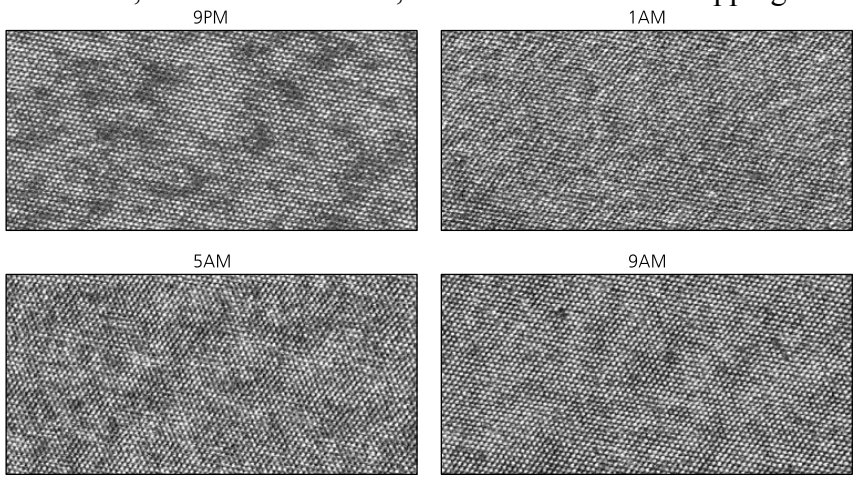


Figure: Unassisted overnight scan of the water/mica interface, measured by AM-AFM. Note the atomic resolution throughout the whole experiment, and point defect in the last image at 9AM.

References:

[1] T. E. Schaeffer, J. P. Cleveland, *et al*., J. Appl. Phys. **80**, 3622 (1996)
[2] A. Labuda, K. Kobayashi, Y. Miyahara, P. Grütter. Rev. Sci. Instrum. **83**, 053702 (2012)
[3] A. Labuda, K. Kobayashi, *et al*., AIP Advances **1**, 022136 (2011)
[4] R. Proksch and S. V Kalinin, Nanotechnology **21**, 455705 (2010)
[5] A. Labuda, Y. Miyahara, *et al*. Phys. Rev. B **84**, 125433 (2011)

On-chip characterization and sorting of engineered nanomaterial surface properties by real-time affinity monitoring

C. Desmet, A. Valsesia, S. Muldur, V. Spampinato, G. Ceccone, P. Colpo, F. Rossi
European Commission Joint Research Centre, Institute for Health and Consumer Protection, NanoBioScience Unit, Ispra, Italy.

Abstract: In the context of the extensive use of engineered nanomaterials (ENMs) in consumer products, industrial applications and nanomedicine, there is an important need of new methods for an exhaustive characterization of their physico-chemical properties. Among them, surface hydrophobicity is considered as an important property since it has a critical role in various processes such as protein adsorption, interaction with biological membranes or cellular uptake potentially related to an increase in toxicity, immune response, or haemolytic effect. Hence, it has been demonstrated that the ENMs hydrophobicity is a key factor to be controlled, in particular for nanomedicine applications [1,2,3].
Furthermore, the few existing processes dedicated to the full characterization of ENMs involve different techniques, which make it expensive and highly time-consuming. In this work we developed an inexpensive characterization process thanks to a disposable chip connected to an optical reader. The device proposed here enables the sorting of ENMs according to their hydrophobicity and surface charge, together with the characterization of their size and shape. The detection platform is based on the use of a micropatterned surface with tuned surface properties to bind ENMs selectively by hydrophobic forces and electrostatic interactions (Figure 1). The surface modifications were realized using different plasma coatings and layer-by-layer deposition of two types of polyelectrolytes, providing a broad range of combinations of surface hydrophobic groups and dissociable charged groups. The real-time absorption of ENMs on the differently functionalized microareas is monitored by a microscope-coupled camera, providing also ENMs characterization in terms of size distribution and shape. It gives information on the kinetics of adsorption, related to the affinity of the ENMs for the different surfaces. A microfluidic chamber coupled to a high-precision peristaltic pump enables the controlled dispensing of the ENMs on the detection platform. The key advantage of the device is the increase of the characterization throughput thanks to the all-in-one characterization process and the multiplexing that is able to replace the use of different methods and expensive equipment. In this way, the full characterization of ENMs could be expanded in all the areas covering nanomaterial-related applications.

Keywords: nanoparticles characterization, nanoparticles hydrophobicity, engineered nanomaterials, nanomedicine application.

References:

1. M. C. Jones *et al.* (2014) *Journal of Controlled Release*, 183, 94–104.
2. S. E. Mc Neil (2009) *Wiley Interdisciplinary Reviews: Nanomedicine and Nanobiotechnology*, 1, 264–271.
3. F. Shima *et al.* (2013) *Biomaterials*, 34, 9709-9716.

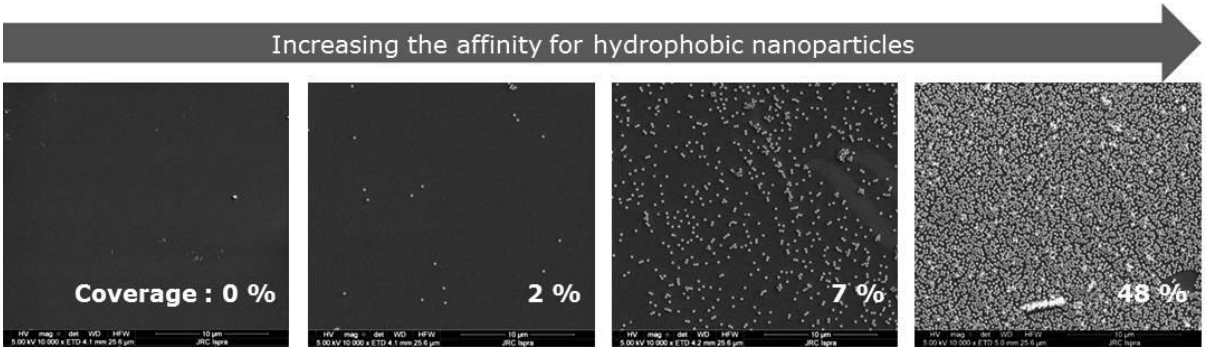


Figure 1. Hydrophobic particles sorting on surfaces with tuned properties (SEM images)

HPLC Optimization for Clotrimazole Assay in Microemulsion and Microemulsion-Based Gel

P. Boonme,[1,2*] J. Kaewbanjong,[1,2] T. Amnuaikit,[1] E.B. Souto[3]
[1]Department of Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Songkhla, Thailand
[2]Nanotec-PSU Center of Excellence on Drug Delivery System, Songkhla, Thailand
[3]Department of Pharmaceutical Technology, Faculty of Pharmacy, University of Coimbra, Coimbra, Portugal
*Corresponding author: prapaporn.b@psu.ac.th

Abstract:
Topical antifungal drugs are widely used to avoid systemic adverse effects and to directly deliver the drugs to the infection sites; however, conventional dosage forms have difficulty to effectively reach the target due to barrier function of the stratum corneum. Novel formulations such as microemulsions (MEs) and microemulsion-based gels (MBGs) are useful for topical drug delivery due to their skin penetration enhancement, production facilities and good appearance (Souto *et al*., 2011). To assay the drug concentration in these novel formulations, a quantitative analysis with high sensitivity has to be carried out. This study aimed to validate a high performance liquid chromatography (HPLC) method for fast measurement and quantification of clotrimazole loaded in a ME and a MBG. The HPLC method was modified from a previous report (Hoogerheide *et al*., 1981). In this study, a C18 column (5 μm, 150x4.6 nm) was used. A mixture of methanol and 0.025 M potassium dihydrogen phosphate (75:25 v/v) was a mobile phase. The flow rate was controlled at 1.0 ml/min. The injection volume was 10 μl and the wavelength detector was fixed at 254 nm. The data were integrated with the RF 10A (version 1.1) LC software program. Clotrimazole standard solutions were prepared at 0.3, 0.6, 0.9, 1.2 and 1.5 mg/ml in the mobile phase. Validation of the method was performed according to International Conference on Harmonisation (ICH) guidelines (Commission of European Communities, 1996). ME was prepared by simply mixing 20% w/w isopropyl palmitate, 20% w/w Tween 80, 20% w/w Span 80, 13.33% w/w isopropanol and 26.67% w/w water. Clotrimazole ME was prepared by dissolving 1% w/w the drug in ME. Clotrimazole MBG was prepared by adding 5% w/w fumed silica in clotrimazole ME (Kaewbanjong *et al*., 2014). Before assay, the 1 g clotrimazole ME was extracted with 10 ml absolute ethanol by vigorously shaking and filtering to obtain the HPLC sample. The 1 g clotrimazole MBG was extracted with 10 ml absolute ethanol by mixing in tightly closed container, heating the mixture at 50°C in water bath for 5 min, shaking to room temperature after removing from water bath, cooling in a methanol-ice bath for 15 min, centrifuging and collecting the supernatant. The residue in the centrifuge tube was repeatedly extracted with 10 ml absolute ethanol by the identical steps. The first and second extractions were mixed to obtain the HPLC sample (Hoogerheide *et al*., 1981). It was found that the retention time of clotrimazole was about 8.5 min and no interferences were observed. Calibration curve was in the linearity. Mean recoveries were 99.03-100.33% and mean coefficients of variation were 0.1298-0.6636% for intraday and 0.1366-1.1554% for interday. Limit of detection and quantification were calculated as 0.005 and 0.010 mg/ml, respectively. Drug concentration in the ME and MBG were 9.66±0.03 and 9.84±0.07 mg/g which were equal to 91.73±0.27% and 102.30±0.74% labeled amount, respectively. This analytical method was found to be suitable to determine clotrimazole concentration in both ME and MBG. However, the data of our preliminary study suggested that the extraction process had to be carefully performed to avoid alcohol loss via evaporation. Overall, it could be concluded that this modified HPLC method was optimized for quantitative assay of clotrimazole in novel formulations, i.e., ME and MBG. These formulations can be further used for treatment of skin fungal infection.

Keywords: clotrimazole, HPLC, ICH, microemulsion, microemulsion-based gel.

References:

Commission of European Communities. (1996) Validation of analytical procedures. *Proceedings of International Conference on Harmonisation (ICH)*.

Hoogerheide, J.G., Strusiak, S.H., Taddei, C.R., Townley, E.R., Wyka, B.E. (1981) High performance liquid chromatographic determination of clotrimazole in pharmaceutical formulations. *J. Assoc. Off. Anal. Chem.*, 64(4), 864-869.

Kaewbanjong, J., Amnuaikit, T, Boonme, P. (2014) Formulation and characterization of clotrimazole microemulsions and microemulsion-based gels. *Int. J. Nanosci.*, 13(4), 1440005.

Souto, E.B., Doktoraovava, S, Boonme, P. (2011) Lipid-based colloidal systems (nanoparticles, microemulsions) for drug delivery to the skin: materials and end-product formulations. *J. Drug Del. Sci. Tech.*, 21(1), 43-54.

Structural characterization of DPPC nanosized liposomes by optical and cryo-electron microscopy: interactions with bovine serum albumin

Rachana[1,2,*] J. Bellare[1], and R. Banerjee[1]
[1]Department of Biosciences & Bioengineering, Indian Institute of Technology Bombay, Powai, Mumbai, Maharashtra, India
[2]Department of Biotechnology, JayPee Institute of Information Technology, Sector-62, Noida, Utter Pradesh, India

Liposomes have been widely used for drug delivery. Whether, it is the case of studying the surfactant system of lungs or designing a liposomal drug delivery system, it is important to characterize liposomal preparations, ensuring their functionality. As, shapes, sizes and aggregation patterns of liposomes are correlated with their functions (Goerke, 1998), present study is an attempt to characterize the model liposomal preparations of dipalmitoylphosphatidyl choline (DPPC), morphologically and functionally (surface activity, *in vitro*), in presence and absence of, albumin and "blood serum", which may be present in the lung alveoli in case of: Adult Respiratory Distress Syndrome (ARDS) *etc*. (Holm et al, 1985; Rachana et al, 2004). Liposomes may also interact with various blood components while in systemic circulation during drug delivery, affecting their half-life and functionality. In the present study, bovine serum albumin (BSA) and serum were allowed to interact with DPPC liposomal preparations and were observed under optical and, cryo-TEM.Results have shown increase in size (from 50-100nm to ~200nm) and many morphological changes in their aggregation patterns such as: liposome engulfing, piling up (figure1) and rosette formation. No intact liposomal structures were observed on incubation with serum under optical microscope and very rare, 100-150nm liposomes were observed under cryo-TEM. Adsorption in the presence of albumin reflected an improvement in adsorption of DPPC liposome and the surface tension obtained at 1 sec of adsorption was reduced to 52.2 ± 0.9 mN/m,against 68mN/m (for pure DPPC) and to 49.8 ± 0.4 mN/m against 61 mN/m, after 30 min. However, if serum is also present at the site of delivery, the functionality of the liposomal preparation might be compromised and therefore, it should be carefully dealt with, while designing drug delivery system for diseases like, trauma induced ARDS.

Key words: Lung surfactant, DPPC liposomes, albumin and lung surfactant, nano liposomes

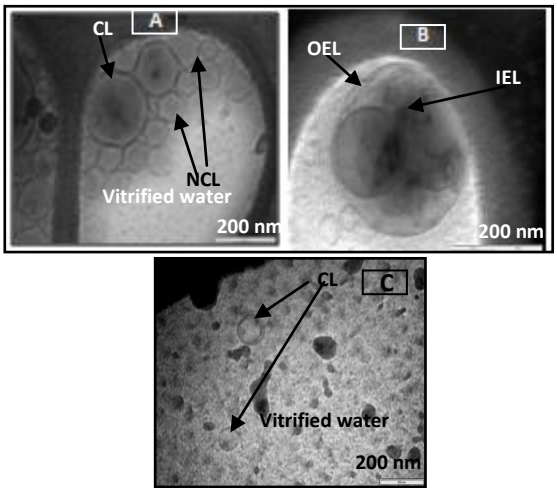


Figure 1: A: cryoTEM for Pure DPPC liposomes; B: With albumin, C: With serum, describing the morphological changes induced due to interaction of albumin with
DPPC liposomes. Albumin treatment causes an increase in size and engulfment of smaller liposomes by bigger liposomes (OEL = outer extended liposome, IEL = Inner engulfed liposome, CL = circular liposome, NCL = non circular liposome)

References:

Holm, B. A., Notter, R. H. and Finkelstein, J. H., (1985), Surface property changes from interactions of albumin with natural lung surfactant and extracted lung lipids, *Chem. Phys. Lipids*, 38, 287-298.

Goerke, J., (1998), Pulmonary surfactant: function and molecular composition, *BBA*, 1408, 79-89.

Rachana and R. Banerjee, (2004) , Interaction between hematological derivatives and dipalmitoylphosphatidylcholine: implication in Adult Respiratory Distress Syndrome,*Colloids Su*

Nanometer scale characterizations of InGaN nanorods grown on GaN template

Y. EL Gmili,[1*] S. Sundaram,[1] R. Puybaret,[1,2] X. Li,[1,2] P. L. Bonanno,[1,2] C. Pradalier,[1,2] P. L. Voss,[1,2]
J.P. Salvestrini,[1]and A. Ougazzaden,[1,2]
[1]CNRS, UMI 2958 Georgia Tech - CNRS, 57070 Metz, France
[2]Georgia Institute of Technology, UMI 2958 Georgia Tech - CNRS, 57070 Metz, France
[3]Universite de Lorraine, Supelec, LMOPS, EA4423, 57070 Metz, France

Abstract: The tunability of the fundamental bandgap of indium gallium nitride (InGaN) across the full visible range spectrum has led to the development of a variety of optoelectronic devices including blue, green, red and white light-emitting diodes (Zhang *et al.*; 2011), blue and green laser diodes (Hsu *et al.*; 2012, and Zhang *et al.*; 2013), and solar cells (Matioli *et al.*; 2011, and Lang *et al.*; 2011). For this, thick, high-quality, and In-rich InGaN material is required. However, whatever the approach used (MQW, bulk layer), strain relaxation results in high density of dislocations, which usually act as nonradiative recombination centers and sources of leakage current paths in III-nitride thin films, and/or lead to phase separation. A possible solution to overcome this issue and prevent strain-related degradation of InGaN material is nano selective area growth (NSAG), which exploits 3D relaxation effects to release strain without creation of dislocations, leading to higher indium incorporation and thickness of the InGaN layer. It would also allow the reduction of the piezoelectric effect thanks to the growth along nonpolar or semipolar directions.

In this paper we study the NSAG of thick In-rich InGaN nanorods and nanostripes on GaN/Sapphire templates. First, a 100nm thick negative-tone resist is spin-coated on the GaN substrates by physical vapor deposition. The resist is patterned using an electron-beam lithography system. The part of the resist exposed to the electron beam cross-links into SiO_2. At last, TMAH etching treatment is used to open the nano-patterns (nano-holes and nano-stripes). The diameter of each circular opening is 100nm and the size of the stripe openings is $10x0.1\mu m^2$. A 150nm thick InGaN epilayer was then grown on these patterned templates using MOVPE.

As an example, Fig. 1 a) and b) show SEM images of perfectly selective InGaN nanostructures with excellent hexagonal shapes and smooth semipolar facets in nanorods and irregular triangular r-plane facet formation on the two elongated hexagonal pyramid in nanostripes. Fig. 1 c) shows cathodoluminescence (CL) measurements at low temperature (LT) in planar InGaN, and single InGaN nanostripe and nanorod, respectively. Single luminescence peak centered around 535nm was obtained for the InGaN nanorod instead of an emission peaks with two components for the planar InGaN, centered at 420nm and 520nm, and 464nm and 525nm for the nanostripe. For the whole set of structures, we can also notice a broad luminescence band centered around 590 nm which is attributed to the GaN defect band. In the planar InGaN, the presence of the two luminescence bands can be attributed to the presence of strained and relaxed InGaN sublayers (EL Gmili et al.; 2014), whereas the two luminescence bands observed in the nanostripe might be attributed to two different regions InGaN1 and InGaN2 due to different growth orientations. The indium content can be calculated according to the work of (Orsal et al.; 2014). The In content of the strained and fully relaxed sublayers of planar InGaN are 12% and 21%, respectively. In the nanostripe, the In composition of the two layers are 14% and 21%, whereas in the nanorod only one InGaN phase with 22% of In is revealed. For the same growth condition, the In incorporation in the nanorods is a little larger than in the nanostripes and almost twice as high as in planar InGaN. Further structural and optical characterization of these InGaN nanostructures will be presented.

Keywords: InGaN material, NSAG, SEM and CL.

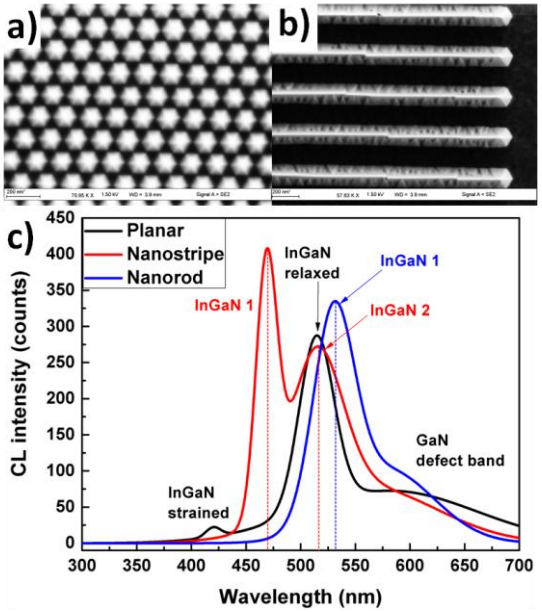


Figure 1: SEM images of InGaN nanostructure arrays grown on GaN/sapphire templates in a) circular opening and b) stripe opening, c) CL spectra at LT (77K) in planar InGaN, and single InGaN nanostripe and nanorod.

References:

Zhang, J., and Tansu, N. (2011), *J. Appl. Phys.*, 110. 113110.
Hsu, P.S., et al. (2012), *Appl. Phys. Lett.*, 100. 021104.
Zhang, J., and Tansu, N. (2013), *IEEE Photon. J.*, 5. 2600111.
Matioli, E., et al. (2011), *Appl. Phys. Lett.* 98. 021102.
Lang, J.R., et al. (2011), *Appl. Phys. Lett.* 98. 131115.
Orsal, G., et al. (2014), *Opt. Mater. Express.*, 4(5) , 6587.
EL Gmili, Y., et al. (2014), *Acta. Mater.* 61(17) , 6587.

Picodiagnostics of Nanomaterials Local Atomic Structure: X-Ray Absorption Spectroscopy and Computer Modeling Synergy

A. Soldatov,* A. Kravtsova, K. Lomachenko, M. Soldatov, A. Bugaev, O. Polozhentsev
Southern Federal University of Russia, Smart Materials Research Center, Rostov-on-Don, Russia

Abstract Method for extraction of 3D local atomic and electronic structure parameters on the basis of combination of x-ray absorption spectroscopy theoretical analysis including multidimensional fitting and ab-initio computer modeling is presented. Applications of this method to several families of nanoparticles including bare and doped by rare earth metals Fe3O4 nanoparticles for bio-medical applications, Cd and Zn chalcogenides based colloidal semiconductor quantum dots are presented. Nanoscale local atomic structure determines most of unique properties of novel nanostructured materials without long range order. To study its fine details one has to use both precise experimental methods (like x-ray absorption spectroscopy) and advanced theoretical simulations. Synergy of these two methods opens a route for picodiagnostics. The status of modern theoretical analysis of the experimental x-ray absorption spectra allows extracting atomic structure parameters with a precision of 1 picometer even for materials without long range order. This technique could be used in-situ and in time-resolved mode. The method for extracting of the 3D atomic structure parameters on the basis of advanced quantitative analysis of X-ray absorption near edge structure (XANES) has been tested for several different families of nanoparticles. The possibility to extract information on both bonding angles and bond lengths is demonstrated.

The results obtained by this method for some classes of nanostructured objects are presented: Bare and doped by rare earth metals Fe_3O_4 nanoparticles for bio-medical applications and Cd (Zn) chalcogenides based colloidal semiconductor quantum dots.

Recent ab initio quantum computer modeling of colloidal quantum dots based on CdS(Se) and ZnS(Se) as well as rare-earth metals-doped quantum dots made it possible to study the features of the atomic and electronic structure of semiconductor colloidal quantum dots of different size, and evaluate the effect of the impurity atoms [2]. Theoretical modeling also proved the sensitivity of XANES for verification of nanoscale atomic structure parameters determined by computer simulation for small quantum dots and to determine the parameters of the local environment of the impurity atoms inside the quantum dot.

In the same way the DFT computer modeling of Fe_3O_4 nanoparticles doped with rare-earth metal atoms and simulations of XANES for both initial and "relaxed" structures around impurity atoms inside the nanoparticle also shows the sensitivity of XANES for verification of nanoscale atomic structure parameters determined by computer simulation and thus, one find a way to determine the parameters of the local environment of the impurity atoms in the Fe_3O_4 nanoparticles of the basis of XANES fitting, proposed previously [1].

Keywords: picodiagnostics, local atomic structure, semiconductor quantum dots, magnetic nanoparticles, dopping, x-ray absorption spectroscopy, DFT simulations, biomedical applications.

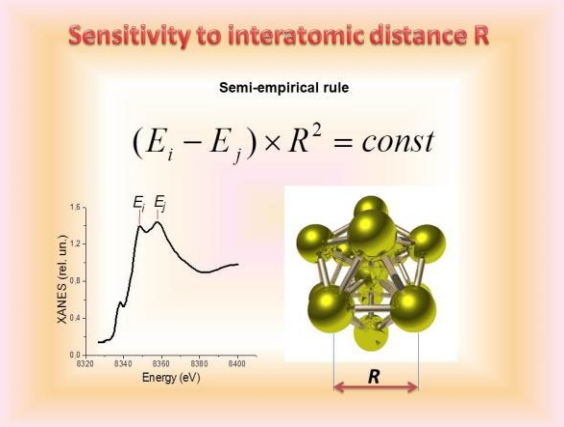


Figure 1. Illustration of high sensitivity of x-ray absorption spectroscopy to small variation of interatomic distances.

References:

1. Grigory Smolentsev, Alexander V. Soldatov (2007), FitIt: new software to extract structural information on the basis of XANES fitting, *Computational Materials Science*, 39 , 569-.

2. A.N. Kravtsova, K.A. Lomachenko, S.A. Suchkova, I.A.Pankin, M.B. Fayn, A.L.Bugaev, A.V. Soldatov, Dopped Quantum Dots of CdTe Family, *Bulletin of the Russian Academy of Sciences. Physic*s, 2015 , in Press

Optical and Structural Characterizations of Phase Transition in Nanoscale Peroskite $CH_3NH_3PbI_3$

Huizhen Wu,* Weiguang Kong, Zhenyu Ye
Department of Physics and State Key Laboratory of Silicon Materials, Zhejiang University, Hangzhou, Zhejiang 310027, P.R. China
**E-mail:hzwu@zju.edu.cn*

Abstract: Organic-inorganic perovskites are newborn optoelectronic materials and show promising applications in both solar cells and lasers. A breakthrough on the methylammonium lead iodide ($CH_3NH_3PbI_3$, denoted as $MAPbI_3$) perovskite has been reported recently: the energy conversion efficiency of the hybrid perovskites photovoltaic devices reached ~19.3% (Zhou, 2014). Moreover, the $MAPbI_3$ has become even promising in application in lasing (Xing,2014). However, up to now little work regard to the the structure-dependent luminescence and the underlying physical mechanisms of this perovskite material has been reported. Little consensus was reached on optical transitions of band to band, defects and interface related effects because of insufficient experimental data. Besides, the previous studies mainly considered the optical properties of the $MAPbI_3$ in a single phase without analyzing the change of crystalline structures. Therefore, comprehensive understanding of the optical properties of $MAPbI_3$ is urgent in order to expand the fields of application for $MAPbI_3$. Moreover, it will help to improve the performance of perovskite-based solar cells.

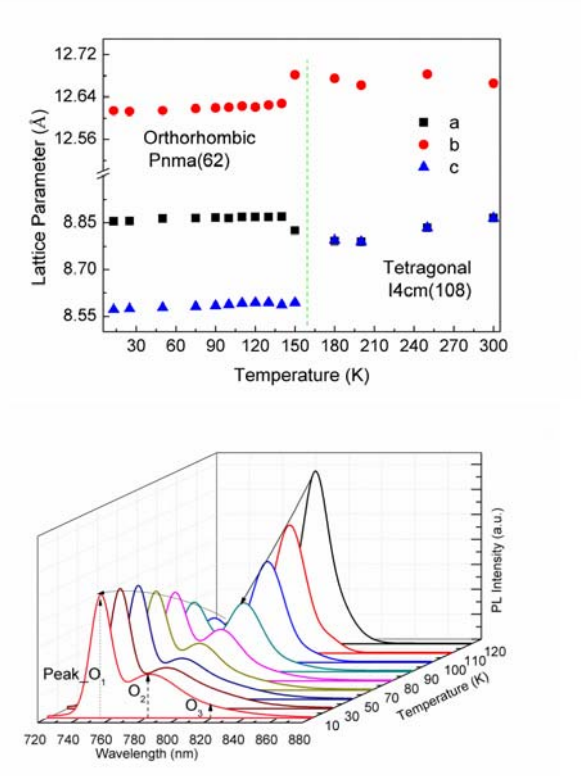


Figure 1: Refined lattice parameters determined by the low temperature XRD (Top). PL spectra of the $MAPbI_3$ perovskite-crystal at variable temperatures, the arrows indicate the evolution tendency of the luminescence intensity (Bottom).

In this work, phase transition in $MAPbI_3$ crystal is explored by the combination of variable-temperature X-ray diffraction (XRD) and steady photoluminescence (PL) with variable excitation power and time resolved PL. Variable temperature XRD results show phase transition of tetragonal-orthorhombic takes place at ~150K, instead, mixture of the two phases are still observable at 130K, which reveals the phase transition in $MAPbI_3$ is a gradual process. Steady and time resolved PL unambiguously reveals the existence of intermediate zone of the two phases. Two luminescence features observed in orthorhombic phase originate from free excitons and donor-acceptor pair (DAP) transitions, respectively. The observed DAPs are formed by the vacancies of iodine and lead in the orthorhombic phase. The phase transition phenomenon is further interpreted by time resolved PL characterization at low temperatures. Our results highlight the understanding of optical properties upon phase transition in $MAPbI_3$ and will be benefit to future optoelectronic devices.

Keywords: organic-inorganic perovskites, phase transition, x-ray diffraction, photoluminescence.

References:

Zhou, H., Chen, Q., Li, G., Luo, S., Song, T. B., Duan, H. S., Hong, Z. R., You, J.B., Liu,Y.S., and Yang,Y. (2014) *Science*, **345** (6196), 542-546.

Xing, G. C., Mathews, N., Lim, S. S., Yantara, N. X., Liu, F., Sabba, D., Gratzel, M., Mhaisalkar, S., and Sum, T. C. (2014), *Nature Materials*, **13** (5), 476-480.

An Investigation of Sb_2Te and $Ge_2Sb_2Te_5$ Phase Change Memory Film Properties Deposited by Pulsed Laser Deposition

S. Emami Khansari,[1] M. Hoffman,[1]
[1]School of Material Science and Engineering, University of New South Wales, Sydney, Australia

Abstract:
Phase change materials (PCMs) are promising candidates for the next generation of non-volatile memories. In this study, Sb_2Te and $Ge_2Sb_2Te_5$ (GST), as the two promising materials for phase change random access memory (PCRAM) application, were deposited by pulsed laser deposition (PLD). The effects of laser energy density and substrate temperature were investigated to obtain optimized deposition condition by reducing the size and number of the particulates as well as the obtaining closer stoichiometry to the targets.

The morphology and topography of the films' surface were studied by scanning electron microscopy (SEM) and atomic force microscopy (AFM). Energy dispersive spectrometry (EDS) was also used to identify the elemental composition of the deposited films and the crystalline structure of the films was investigated by x-ray diffraction (XRD) analysis. The results of SEM and AFM indicate that increase of laser energy density from14 mJ/cm^2 to 21 mJ/cm^2 substantially decreases the size and number of particulates in the surface of the Sb_2Te films as well as the roughness of the particulate free areas. However, in case of GST, the laser energy density does not significantly affect the size and number of the particulates on the surface.

XRD results show that Sb_2Te and GST films deposited at substrate temperature of 20°C are amorphous; with increasing the substrate temperature the Sb_2Te films crystallize to a hexagonal structure with preferred orientation while the GST films first crystallize to a FCC structure and then with further increase of temperature the crystalline structure changes to hexagonal.

Keywords: phase change memory, pulsed laser deposition, $Ge_2Sb_2Te_5$, Sb_2Te

Advanced Transmission Electron Microscopy of Epitaxial-Enabled Morphology Controling ITO NWs

O .I.Lebedev,[1,*] S. Turner,[2] Y. Shen[3], T. Wu[4]
[1]Laboratoire CRISMAT,UMR 6508, CNRS ENSICAEN, F-14050 Caen, France
[2]EMAT, Department of Physics, University of Antwerp, B-2020 , Antwerpen, Belgium
[3]Division of Physics and Applied Physics, Nanyang Technological University, Singapore 637371
[3]Materials Science and Engineering, King Abdullah University of Science and Technology, Thuwal 23955, Saudi Arabia

Abstract: Controlling nanowire morphology in bottom-up synthesis and allowing the assembly of nanowires on planar substrates is of tremendous importance for device applications in electronics, photonics, sensing and energy conversion. To date, there has however been only limited success in reliably achieving these goals, hindering both the fundamental understanding of the growth mechanism and the integration of nanowires in real-world technologies. We will show an impact of the transmission electron microscopy (TEM) as an extremely versatile and powerful technique.

Novel dual-metal Au-Cu alloy nanoparticles were used as a catalyst for tin-doped indium oxide (ITO) nanowire growth. The enhanced mobility of the catalyst nanoparticles (NPs) enables *in situ* seeded growth of branched ITO nanowires (NWs) [1]. The dynamically tuned chemical potentials in the catalyst NPs selectively stabilize a rare cubic indium-tin-oxide phase (ISO), forming epitaxial heterojunctions within individual NW branches. This methodology of selecting phases and forming compositionally abrupt axial heterojunctions in NWs departs from the conventional synthesis routes, giving unprecedented freedom to navigate phase diagrams and promising novel nanomaterials and devices

Here we report that growth of planar, vertical and randomly oriented ITO nanowires can be realized on yttria-stabilized zirconia (YSZ) substrates via the vapor-liquid-solid (VLS) mechanism, by simply regulating the growth conditions, in particular the growth temperature. TEM and reciprocal space mapping experiments reveal the indispensable role of substrate-nanowire epitaxy in the growth of oriented planar and vertical nanowires at high temperatures, whereas randomly oriented nanowires without epitaxy grow at lower temperature [2]. Further control of the orientation, symmetry and shape of the nanowires was achieved through use of YSZ substrates with (110) and (111), in addition to (001) surfaces. Based on these insights, we succeeded in growing regular arrays of planar ITO nanowires from patterned catalyst nanoparticles.

Overall, our discovery of unprecedented orientation control in ITO nanowires advances the general VLS synthesis, providing a robust epitaxy-based approach towards rational synthesis of nanowires.

Keywords: ITO nanowires, advanced TEM, morphology control, phase stabilization.

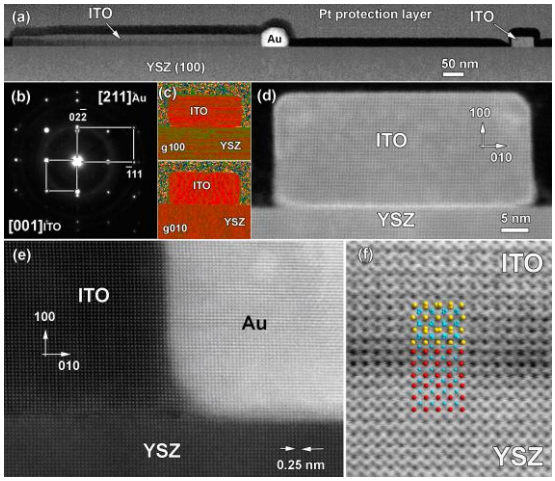


Fig.1 (**a**) Low-magnification STEM-HAADF image of the in-plane nanowires and (**b**) corresponding SAED pattern (**c**) GPA patterns along [100] and [010] directions. (**d**) HR STEM-HAADF cross-section image of ITO nanowire.(**e**) STEM-HAADF image of the tri-junctions of the ITO, YSZ and Au particle. (**f**) STEM-ABF image of ITO / YSZ interface with overlayed structural model

References:

[1] J.Gao, O.I.Lebedev, S.Turner, Y.F. Li, Y.H.Lu, Y.P.Feng, P.Boullay, W.Prellier, G.Van Tendeloo, T.Wu (2012) Selective phase stabilization and epitaxial axial heterojunctions in branched oxide nanowires *Nano Letters* **12(1)** 275-280
[2] Y. Shen, S.Turner, P.Yang, G.Van Tendeloo, O.I.Lebedev, T. Wu (2014) Epitaxy-Enabled Orientation Control in Tin-doped Indium Oxide Nanowires *Nano Lett.* **14** 4342-4351

Dynamic Characteristics of Carbon Nanotube Based Nano-composites with Atomic Vacancy and Stone-Wales Defects

Sachin O. Gajbhiye[1*] S. P. Singh[1]
[1]Department of Mechanical Engineering, Indian Institute of Technology Delhi,
Hauz Khas, New Delhi 110016, India

Abstract: A unique atomic structure of carbon nanotube unveils outstanding properties. This makes it potentially highly valued reinforcing material to strengthen composite materials. But, the presence of defects in the nanostructure substantially alters the material's properties. So, the static and dynamic characteristics of carbon nanotube based nanocomposites subjected to atomic vacancy and Stone-Wales defects are studied using nonlinear representative volume element. The carbon-carbon bond of nanotube is modeled using Tersoff-Brenner potential. The H110MA grade polypropylene is used as matrix material and its properties are tested in the laboratory which are further used to model it. The interaction between nanotube and polymer matrix is modeled using nonlinear spring elements in the presence of defects in reinforcing material. These interactions are represented by Lennard-Jones potential. The atomic vacancy and Stone-Wales defects are created in the atomic model of the nanocomposite material. In the designed representative volume element, the nanotube is surrounded by the matrix material from all direction as shown in Figure 1. It is observed that the presence of defect in the nano-structure significantly alter its static and dynamic characteristics when they are used alone but when it is dispersed in the matrix material the influence of defects in negligible.

Keywords: Carbon nanotube, Nanocomposites, Representative volume element, Atomistic vacancy defect, Stone-Wales defect, Tersoff-Brenner potential.

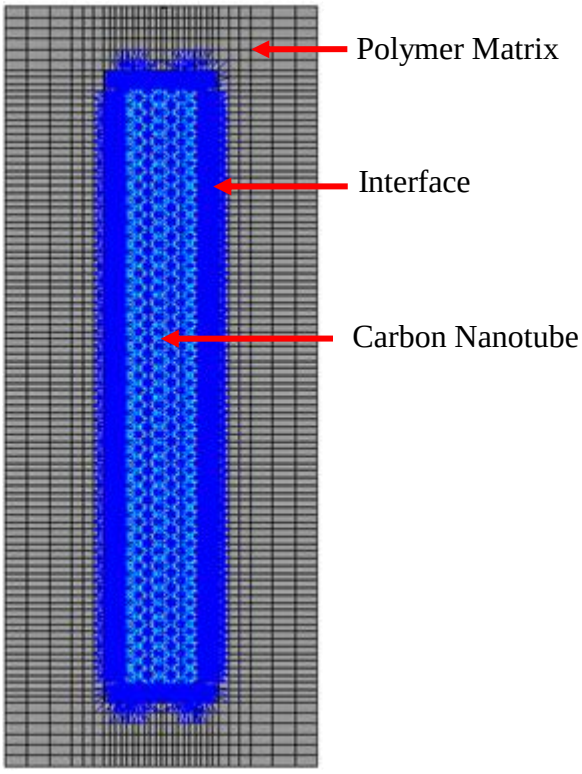


Figure 1. Representative volume element

Figure 1 shows the representative volume element of the nanocomposite material. The carbon nanotube is surrounded by the polymer matrix from all direction. Clearance is maintained amongst the carbon atoms of nanotube and polymer matrix which is equal to the equilibrium distance between carbon atoms of these two materials. The interface region is modelled using Lennard-Jones potential.

Multi-scale characterization of chitosan-nanoemulsion blended film

R.R.A. Soares*, M. C. Bourkaib, K. Delion, M. Guillemin, N.E. Amrani, W. Xu, E.A. Tehrany
Laboratory of engineering of biomolecules, ENSAIA, University of Lorraine, Nancy, France

Abstract: Edible films have recently received increased attention due to their various advantages including biodegradability and edibility. Among many materials that can be used to form edible films, chitosan is one of the most promising as it has a good film forming ability, which makes it suitable for use as a food packaging. Objective of this study is to functionalize the chitosan by adding the nanoemulsions from vegetable sources. After functionalization, physico-chemical, mechanical, morphological, chemical composition and structural properties of chitosan and chitosan/nanoemulsions blend films are studied. Various techniques are used to realize the multi-scale characterization of these films such as AFM, DMTA, WAXS, digidrom. The results show the wettability, mechanical, rheological, morphological and structural properties of chitosan were significantly affected by adding the nanoemulsions. Water contact angle of chitosan is decreased significantly by incorporation of lecithin. Decreasing of contact angle depends on lipid composition. We observe that mechanical property of chitosan changes by adding the nanoemulsions as plasticizer. We can conclude the incorporation of nanoemulsion as vector in chitosan develops a new matrix in food/packaging with an important role on physico-chemical properties. We can use the nanoemulsions to encapsulate the active molecules like as antioxidants and aromas compounds.

Keywords: nanofunctionalization, nanoemulsion, multiscale characterization, packaging application

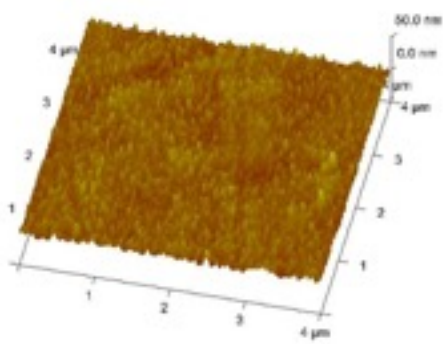


Figure 1. Figure illustrating the AFM image of chitosan.

References:

Imran M., Revol-Junelles A.M., Martyn A., Tehrany E.A., Jacquot M., Linder M., Desobry S. (2010) Active food packaging evolution: transformation from micro- to nanotechnology, *Critical Reviews in Food Science and Nutrition.*

Imran M., Revol-Junelles A. M., René N., Jamshidian M., Akhtar M. J., Tehrany E. A., Jacquot M., Desobry S. (2012) Microstructure and physico-chemical evaluation of nano-emulsion-based antimicrobial peptides embedded in bioactive packaging films, *Food Hydrocolloids.*

A. Seeboth, D. Lötzsch. (2003) Encyclopedia of Polymer Science and Technology, 3rd edition, John Wiley & Sons, New York.