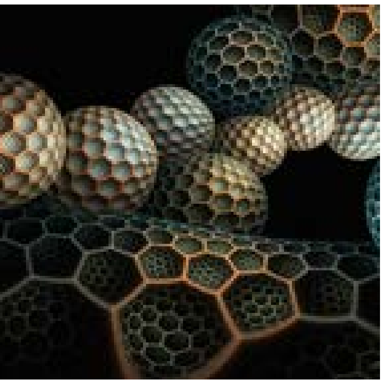
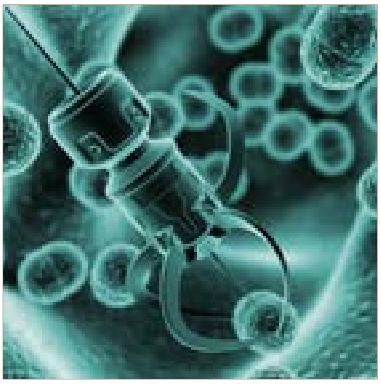
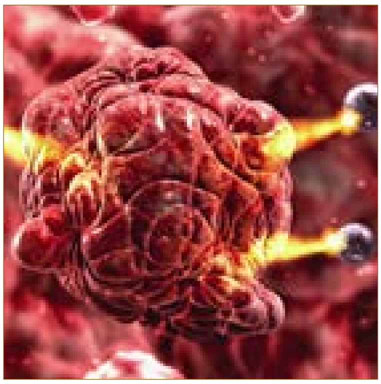
Scientific Tracks & Abstracts
May 21, 2018

ICNST 2018







International Conference on

Nanoscience & Technology

May 21-22, 2018 | New York, USA

Capsize of polarization in dilute photonic nanocrystals

Vladimir Gasparian
California State University, USA

We investigate, experimentally and theoretically, polarization rotation effects in photonic crystals with transverse permittivity inhomogeneity perpendicular to the traveling direction of waves. A new concept of dilute photonic crystal is introduced that allow to develop an analytical approach in theory as well as easily prepare a periodical system for experiments. A capsize, namely a drastic change of polarization to the perpendicular direction is observed in a one-dimensional photonic crystal in the frequency range 10÷140 GHz. To gain more insights into the rotational mechanism, we have developed a theoretical model of dilute photonic crystal, based on Maxwell's equations with a spatially dependent two dimensional inhomogeneous dielectric permittivity. We show that the polarization's rotation can be explained by an optical splitting parameter appearing naturally in Maxwell's equations for magnetic or electric fields components. This parameter is an optical analogous of Rashba like spin-orbit interaction parameter present in quantum waves, introduces a correction to the band structure of the two-dimensional Bloch states, creates the dynamical phase shift between the waves propagating in the orthogonal directions and finally leads to capsizing of the initial polarization. Excellent agreement between theory and experiment is found. Discrete polarization states that we have found in dilute photonic crystals can be very useful for quantum computing purposes.

Speaker Biography

Vladimir Gasparian has completed his PhD at the age of 28 years from Yerevan Sate University (Armenia). He is the Professor of California State University, Bakersfield. He has published more than 100 papers in reputed journals and has been serving as an editorial board member of repute.

e: vgasparyan@csub.edu

Notes:

High fracture strength of alumina hollow nanostructures for high-efficiency GaN LEDs

In-Suk Choi
Seoul National University, South Korea

In the present study, we set out to show that α-alumina hollow nanoshell structure can exhibit an ultrahigh fracture strength even though it contains a significant number of nanopores. By systematically performing insitu mechanical testing and finite element simulations, the high fracture strength of an α-alumina hollow nanoshell structure can be explained in terms of conventional fracture mechanics even at the nanoscales. More importantly, by deriving a fundamental understanding, we would be able to lay down predictions and guidelines for the design of reliable ceramic nanostructures for advanced GaN LEDs. To that end, we demonstrated how our ultra-strong α-alumina hollow nanoshell structures could be successfully incorporated into GaN LEDs, thereby greatly improving the luminous efficiency and output power of the LEDs

Speaker Biography

Choi is an AssociateProfessor in the department of materials science and engineering at Seou National University. He earned his BS degree from Seoul National University, MS degree from Stanford University and Ph.D. degree from MIT in Materials Science and Engineering. He conducted his postdoctoral research at Karlsruhe Institute of Technology in Germany and then worked as a principal research scientist at Korea Institute of Science and Technology (KIST) before joining the Seoul National University. He is currently serving as editorial board members in several domestic and international journals. At present, his work focuses on developing advanced structure materials for extreme condition.

e: insukchoi@snu.ac.kr

Notes:

Metal and semiconductor nanoparticles and their polymer fibres

Makwena Justice Moloto
Vaal University of Technology, South Africa

Quantum dots (QDs) are semiconductor nano-particles, which have many unique properties and show interesting phenomena, such as size dependent emission wavelength, narrow emission peak and broad excitation range. QDs have been studied for almost three decades and are nano-crystals in which excitons are confined in all three spatial dimensions. The confinement can be realized by fabricating the semiconductor in very small size, typically several hundred to thousands of atoms per particle. Due to quantum confinement effects, QDs act like artificial atoms, showing controllable discrete energy levels. QDs were first fabricated in the 80's by Louis E. Brus and the unique properties of these special nano-structures attracted interest from many fields. CdSe is a binary semiconducting material of cadmium and selenium. CdSe is being developed in research for use in opto-electronic devices, nanosensing, and biomedical imaging. This presentation will be focused on CdSe and other metal based chalcogenides such as AgSe, CuSe and Ag. Various methods have been explored in making metal chalcogenide nanoparticles and for example, CdSe nanoparticles are prepared using a solution of cadmium and selenide under controlled conditions. The incorporation of nanoparticles prepared into the polymer PMMA using electrospinning technique in order to make polymer fibre. Variation of percentages of CdSe nanoparticles into the polymer cause coiling of fibres and decreased luminescence intensity. CdSe nanoparticles were also used as core in the synthesis of CdSe/ZnO and CdSe/PbS nanomaterials using thioglycerol, hexadecylamine and trioctylphosphine oxide. The semiconducting, metal nanoparticles and polymer fibres will be discussed for their synthesis and characterization; their properties will be explored from their synthetic conditions.

Speaker Biography

Makwena Justice Moloto has completed his PhD at the age of 30 years from the University of Zululand and spends time at the University of Manchester to complete his PhD hosted by school of chemistry. He is the researcher at one of the technically orientated university in the department of chemistry. He has published more than 40 papers in reputed journals and has been serving as a reviewer for a number of materials chemistry journals of repute.

e: makwenam@vut.ac.za

Notes:

Development and characterization of Organometallic for the Luminance Purposes

Jothi Narayanan
Madurai Kamaraj University, India

This article deals about Organometals for illumination by an excitation emission process. The present inorganic compounds are high expensive and having very poor quantum efficiencies. We developed organometallic at low cost with high quantum efficiencies. The sample were characterized by NMR, to identify the structure confirmation of Butanone, 4-hydroxy butyrate and Glutamine of aliphatic nature by identified of strong bond to exhibit polycrystallinity. This polycrystallinity ensure by XRD spectrum and size of inorganic nature was calculated with de-spacing. The illumination efficiency determined by UV spectrum the graph was explained. The present sample/compounds are high efficiency and useful for the future semiconducting LED purpose

Speaker Biography

Jothi Narayanan received his master's in physics from Madurai Kamaraj University, Madurai, India. He is currently a research student under the guidance of Dr. T. Arockiadoss at Particle physics and Chemistry research laboratory, Madurai Kamaraj University.

e: thevajothi@gmail.com

Notes:

Nano/Meso-scale surface engineering for designing orthopedic implants

Hamid Reza Hosseinzadeh
Rowan University, USA

Infection is one of the most catastrophic complications in medicine, esp. orthopedic field. Since in almost all orthopedic surgeries, we implant a device in the patient's body, if an infection happens, due to biofilm formation and attachment of bacteria to the surface of the implant, removal of the implant is almost always a must. Many attempts have been done to prevent this attachment and biofilm formation, like bactericidal silver coating or antibiotic coating, but none of them had a promising result. So, we decided to try to solve this problem with another approach. If we can prevent the biofilm formation, all the attachment mechanisms of the bacteria are disrupted. For this goal, we developed a computational software for multiscale multiphysics simulation of metallic medical devices to design medical devices mainly from nano and micro scale which is connected to macroscale features. Several nanoscale/microscale/mesoscale physicochemical phenomena could be simulated in this software i.e. protein and bio-ingredients adhesion, local corrosion (Pitting and Crevice), mechanically assisted corrosion cracks/microcracks, wear mechanisms, ions release via corrosion, surface electrostatic charges, local stress concentration, oxide layer formation/passive layer, biomaterials microstructural evolution in contact with human body and etc. Macroscale computational features in the software are algorithms for mechanical stress and fluid dynamics calculations. We have developed a 3D Graphical User Interface (GUI) for designing overall simulation domain details and for post-processing. Main computational algorithms and modules in the software are macroscale stress strain evolution (numerical solution of conservative equations), biomaterials microstructural evolution (cellular automata and phase field), fluid dynamics of human body (numerical solution of conservative equations), studying corrosion (multiscale and multiphysics approach), microcracks formations under stress and corrosive environment (multiscale and multiphysics approach), dynamics of bio ingredients in human body i.e. bacteria and protein (Newtonian approach), simulating infection physically (multiscale and multiphysics approach).

Speaker Biography

Hamid Reza Seyyedhosseinzadeh is an orthopedic surgeon and an associate professor at Rowan University and leads the Orthopedic Research Group. His special expertise is in Hip and Knee arthroplasty and designing Implants for hip and knee. During the past 6 years, he has conducted a large, multi-institutional study on "Ethnic Knee Design". Now he is leading the orthopedic research group at Rowan University, with great emphasis on biomechanical and engineering aspects of orthopedics. In this group, a novel approach to implant material is underway by designing new "Metamaterials" for orthopedic implants.

e: hamid@rowan.edu

Notes:

A biasing method for programming of nonlinear memristor-based neural network

Hyongsuk Kim
Chonbuk National University, Republic of Korea

A biasing method for programming of nonlinear memristor-based neural networks is addressed in this paper. Weights of neural networks are designed based on Memristor Bridge Synapse. Despite many significant benefits of the memristor bridge synapse, there is one critical weakness that programming at its extreme (max or min) states is nonlinear due to boundary effects of memristors, which is common in most of nano-devices. It is an important issue when a neural network is to be programmed or a learned neural network is to be reproduced for multiple copies. In this study, a novel architecture of a modified memristor bridge synapse is also proposed. In the modified architecture of the Memristor Bridge Synapse in which two switches are added for initialization and programming of the synapse, the boundary effect issue is avoided by biasing the Programming Origin to the middle of linear region.

Speaker Biography

Hyongsuk Kim completed his Ph.D. from University of Missouri, Columbia, USA. and his area of research interest is Memristor theory and applications, Vision-based robot navigation and Vision-based defect detection on object surfaces. Presently he is working as a professor in Chonbuk National University, Republic of Korea.

e: hskim@jbnu.ac.kr

Notes:

Nanotechnology for sustainable buildings

Attmann O
University of Colorado, USA

As a principle element of architecture, technology has allowed for the wall to become an increasingly dynamic component of the built environment. The traditional connotations and objectives related to the wall are being redefined: Static becomes fluid, opaque becomes transparent, barrier becomes filter and boundary becomes borderless. Combining smart materials, intelligent systems, engineering, and art can create a component that does not just support and define but significantly enhances the architectural space. This paper presents an ongoing research project about the development of a new class of architectural wall system by incorporating distributed sensors and macroelectronics directly into the building environment. This type of composite, which is a representative example of an even broader class of smart architectural material, has the potential to change the design and function of an architectural structure or living environment. As of today, this kind of composite does not exist. Once completed, this will be the first technology of its own.

Speaker Biography

Osman Attmann is an Associate Professor at the School of Architecture, University of Colorado at Denver. As an active scholar, Professor Attmann publishes and lectures regularly on architectural technology and green architecture. In addition to authoring and co-editing more than seventy papers, he has a published book, "Green Architecture," in 2010, two edited books, and four book chapters. His writings have appeared in various journals and conferences.

e: o.attmann@ucdenver.edu

Notes:

Influence of depolarizing fields and screening effects on phase transitions in ferroelectric composites

Alexander Sidorkin
Voronezh State University, Russia

The general increase in the requirements for functional opportunities of different devices has sharply increased the demands for their elemental base. Natural materials no longer satisfy the growing technological and operational requirements due to the limited range of operating parameters, randomness of their characteristics and the absence of opportunities for changing functional parameters. Artificial nanomaterials with controlled properties, based on the influence of nanoscale effects on the properties of materials, one of them is ferroelectric nanocomposites, fit better for these purposes. An important characteristic for practical application of these materials is temperature range, where ferroelectric properties are observed in the researched composites. Factors reducing their Curie point TC are the correlation effects as well as the depolarizing fields arising near the surface of the ferroelectric inclusions. The present work calculates depolarizing fields arising near the boundaries of a spherical ferroelectric inclusion in an isotropic dielectric environment and evaluates the effect of these fields, and screening effects on the Curie point in the composites. The studies of depolarizing field effects on the transition temperature in ferroelectric composites, with spherical ferroelectric inclusions embedded in the dielectric matrix, demonstrate that, in the absence of screening effects, the decrease of the Curie point in composites compared with bulk materials is determined by the ratio of the ferroelectric inclusion Curie constant to the permittivity of the matrix. The TC shift in these composites with screening is reduced by multiplying the above value by a decreasing factor equal to the ratio of the screening length to the radius of the ferroelectric inclusion. The authors suppose that the example of such material can be a composite of nanocrystalline cellulose with ferroelectric sodium nitrite, for which the Curie point is displaced approximately 40 degrees lower on the temperature scale relative to bulk sodium nitrite. Another demonstration of depolarizing fields and screening effects' influence is the behavior of the mixture composite triglycine sulfate and silica.

Speaker Biography

Alexander Sidorkin, doctor of physical and mathematical sciences, professor of the department of experimental Physics, Voronezh State University, Russia. He is the author of over 200 scientific works, including several books. A.S. Sidorkin is a head of several scientific grants, participant of numerous scientific conferences, member of Scientific Council of Russian Academy of Sciences on Dielectric and Ferroelectrics, Honored Worker of Higher Professional Education of the Russian Federation.

e: sidorkin@phys.vsu.ru

Notes:

Phyto-mediated synthesis, photocatalytic and biological activities of Zno, Cao, and Sno_2 nanoparticles

Osuntokun, J
North-West University, South Africa

Green chemistry proffers an alternative route to conventional physical and chemical method of nanoparticle synthesis, and has earned the interest of researchers worldwide. This is due to the several advantages which this synthetic method offers. Green synthesis of nanoparticles via the use of aqueous plant extract provides environmentally benign and cheap route to the synthesis of nanoparticles. In this work, we have synthesized ZnO, CaO and SnO_2 nanoparticles using aqueous broccoli extract and characterized the prepared nanoparticles with X-ray diffraction (XRD), transmittance electron microscopy (TEM), UV-vis absorption and fourier transform infrared (FTIR) spectroscopic techniques. Antibacterial activities of the nanoparticles have been evaluated against strains of *S. aureus* and *P. aeruginose* bacteria. The nanoparticles all exhibited greater antibacterial potency towards *S. aureus* than *P. aeruginose* bacteria with ZnO nanoparticles being the most potent against the aforementioned bacterial strains. Photocatalytic properties of the nanoparticles were studied for the reduction of methylene blue and bromocresol green. All the nanoparticles showed different degrees of photodegradations of the organics dyes and similarly ZnO nanoparticles displayed a greatest efficiency of photocatalytic degradation followed by SnO_2 and CaO nanoparticles exhibited the least efficiency.

Speaker Biography

Osuntokun J completed his Ph.D. in 2016 from University of Fort Hare, South Africa. He is presently a postdoctoral research fellow in North-West University, South Africa. He has about 10 publications in international reputed journals.

e: jejenijarr@gmail.com

Notes:

Treating Melanoma with [^{225}Ac]cdots nanoparticles

Aleksandra M Urbanska
Memorial Sloan Kettering Cancer Centre, USA

Current cancer treatment modalities include surgery, chemotherapy, radiotherapy, and hormone therapy. Unfortunately, none of these approaches is sufficient on its own due to non-specificity and inadequate efficacy. Nanotechnology offers necessary tools which aim to ensure optimal delivery of the desired drug to the target tissue with minimal off-target toxicity to adjacent tissues. Radiotherapy in combination with nanotechnology offers a potentially unique anti-cancer approach. We used Actinium-225, an α particle emitting radionuclide with a 10d half-life and a yield of 4 α particles in its decay chain. Our nanoparticles, cDOTs, are tumor-selective, ultrasmall Cy5 containing, poly(ethylene glycol)-coated silica constructs functionalized with melanoma-targeting peptides. They were approved for a first-in-human clinical trial in 2011 for melanoma patients. To enhance cDOTs specificity and improve oncological use, we conjugated cDOTS to an α melanocyte-stimulating hormone (αMSH)-modified ligand. MSH is an endogenous peptide hormone and neuropeptide of the melanocortin family. First we confirmed the uptake of these cDOTs by B16/F10 melanoma cell line using imaging and FACS. The complete uptake was observed after 72h. We performed a biodistribution study of [^{225}Ac]cDOTs-MSH in naïve and tumor bearing mice. Moreover, we evaluated the maximum tolerated dose (MTD) in melanoma tumors bearing mice. Four doses were tested, 0, 625, 1250 and 2500 nCi and a dose of 625 nCi was determined to be the MTD. A radiotherapy treatment study using melanoma tumor in immune competent mice was conducted using a dose of 300 nCi. The overall survival was improved in specific and non-specific treatment groups compared to vehicle group. In addition, the tumor size was significantly reduced in specific group when compared to a vehicle group after 30 days of treatment. We also evaluated the changes in T cell and macrophage infiltrates in tumor bearing mice and repot that the greatest infiltration was observed after 96h post treatment.

Speaker Biography

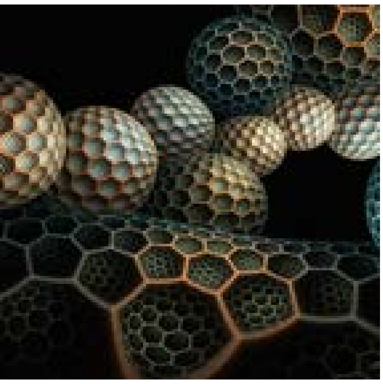
Aleksandra M. Urbanska has completed her PhD from the Department of Biomedical Engineering summa cum laude, Faculty of Medicine at McGill University in Montreal, Canada. She was trained as a postdoctoral fellow at Massachusetts Institute of Technology under supervision of prof. Robert S. Langer as well as at Columbia University Medical Center where she applied her multidisciplinary skills in nanotechnology, stem cells, tissue engineering, biomaterials and drug delivery. She has over 40 publications that have been cited over 800 times. Currently she is a fellow researcher at Memorial Sloan Kettering Cancer Center in New York City.

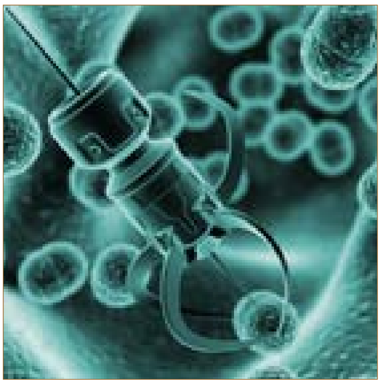
e: aleksandra.m.urbanska@gmail.com

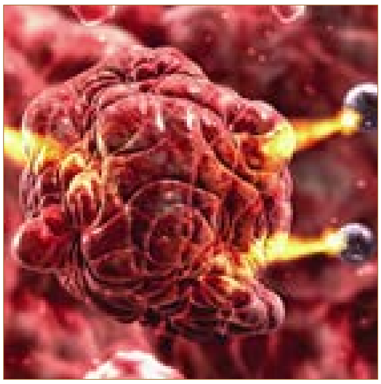
Notes:

Scientific Tracks & Abstracts
May 22, 2018

ICNST 2018







International Conference on

Nanoscience & Technology

May 21-22, 2018 | New York, USA

Semiconductor nanocrystals as functional materials for nanoelectronics

Moloto N
University of the Witwatersrand, South Africa

Semiconductor nanocrystals exhibit exciting and interesting properties as they transition from bulk to the nanoscale. The emergence of new properties is as a result of quantum confinement effects. Semiconductor nanocrystals are attractive materials for use in photovoltaic devices mainly due to their tunable absorption spectrum, large surface area (because of their small size), their adaptability, their ability to generate multiple excitons as well as their capability of hot carrier injection from excited state i.e. by minimizing energy losses during the thermalization of excited state. Semiconductor nanocrystal solar cells are projected to achieve higher efficiencies than silicon based solar cells while reducing the cost of each kilowatt of electricity produced, the raw materials and the processes used to convert the raw materials into functional cells. Semiconductor nanocrystals based gas sensors show much promise as they can detect analytes at low concentration due to the large surface area, can be highly selective as the result of the carrier type and have been shown to operate at room temperature thus reducing the costs. Herein, we report on the synthesis and characterization of various types of metal chalcogenide semiconductor nanocrystals and showcase their versatility through application in both solar cells and gas sensors.

Speaker Biography

Makwena Justice Moloto has completed his PhD at the age of 30 years from the University of Zululand and spends time at the University of Manchester to complete his PhD hosted by school of chemistry. He is the researcher at one of the technically orientated university in the department of chemistry. He has published more than 40 papers in reputed journals and has been serving as a reviewer for a number of materials chemistry journals of repute.

e: nosipho.moloto@wits.ac.za

Notes:

Miniaturizing the test tube with lipid nanotechnology

Steven Lenhert
Florida State University, USA

Miniaturization of laboratory procedures is opening new possibilities in medicine by allowing point of care diagnostics, precision medicine, novel therapeutics, reliable manufacturing of biologics, as well as applications that are likely unpredictable a priori. A fundamental challenge, however, is in the miniaturization of the test-tube. As compartments get smaller, surface effects begin to dominate over gravity and handling of fluids requires new strategies that take advantage of nanoscale effects. Biological systems provide an inspiration for solving this problem through the formation of fluid cellular and sub-cellular compartments defined by lipid bilayers as the boundaries. With this in mind, we have been fabricating arrays of lipid multilayers on surfaces such that they can contain a volume of encapsulated materials such as drugs or other reagents and be externally addressed and analyzed by knowing their position on the microarray. This approach is particularly interesting for miniaturized high throughput screening, where there is potential to test 50,000 drug candidates for efficacy in cell culture on the area of a single microtiter plate. Furthermore, as the lipid multilayers decrease in size novel properties can be exploited, for instance by using optical interference for rapid and label free readout.

Speaker Biography

Steve Lenhert is an Associate Professor in the department of Biological Science and faculty member in the Molecular Biopyscis and Materials Science and Engineering programs at the Florida State University. His doctoral degree is in Biology from the University of Muenster. He did postdoctoral research at Karlsruhe Institute of Tanotechnology in Germany and Northwestern University in the USA performing research in nanobiotechnology. He has published more than thirty peer reviewed publications on this subject, and in his tenure at FSU has pioneered the use of arrays of micro- and nanoscopic lipid droplets for miniaturized high throughput screening and biosensor arrays.

e: lenhert@bio.fsu.edu

Notes:

Development of chemical treatments to improve processability of carbon nanomaterials (carbon nanotubes and graphene)

Nawal Berrada
CNRS-University of Lorraine, France

Carbon nanostructures such as carbon nanotubes (CNTs) and graphene are impressive materials thanks to their remarkable properties: lightness, high chemical stability, strengthness (100-300 times stronger than steel), high specific surface area, high thermal and electrical conductivity. Thus, the possible application fields of carbon nanomaterials are numerous, for instance, mechanics, medicine, electronics. They are now available in high quantity at competing prices thanks to the development of scale-up synthesis methods, in recent years. However, chemical conversion of carbon precursors to CNTs by Chemical Vapor Deposition (CVD) requires metal catalysts that inevitably remain in the as-produced samples. Moreover, both CNTs and graphene being hydrophobic are highly difficult to process. They have tendency to aggregate and restack, which leads to a dramatic decrease of performances. In order to fully benefit of their outstanding properties to develop new materials or devices, well-adapted and efficient post-synthesis chemical treatments have to be applied to these carbon nanomaterials. Particularly, we have precisely investigated their purification and functionalization. Our one-step and gas-phase purification treatment is efficient to prepare super-pure carbon nanotubes. Their covalent and/ or non-covalent surface modifications has been controlled thanks to complementary techniques. We will show how these chemical treatments can be useful for further practical utilization of these carbon nanomaterials.

Speaker Biography

Nawal Berrada completed her Master in 2016 after a project related to the recovery of precious metals from jewelry waste. She has also developed a green alternative method to clean jewels without cyanide-based chemicals under the supervision of Dr. E. Meux at University of Lorraine, Metz. She started her PhD in 2016 at the Institut Jean Lamour (University of Lorraine, CNRS, Nancy) under the mentorship of Dr. A. Desforges and Dr. B. Vigolo. Her work is centered around developing chemical processes on carbon nanomaterials for the purpose of overcoming processing issues. Her activities are mainly devoted to carbon nanotubes and graphenic materials for their selective purification, surface modifications, dispersion and processing. She has developed efficient and innovative chemical treatments to CNTs and her current activities are focused on the further use of the prepared CNTs and graphene, especially as nanofluids for heat transfer improvement.

e: nawal.berrada@univ-lorraine.fr

Notes: