جامعة نواكشوط العصرية
U.N.A.

كلية العلوم والتقنيات
Faculté des Sciences et Techniques

1st International Workshop on Nanosciences & Nanotechnology
IW2N 2022
Hôtel Monotel Dar El Barka
Nouakchott, Mauritanie

1st International Workshop on Nanosciences & Nanotechnology

IWNN-2022

Topics:

- Introduction to Nanosciences & Nanotechnology
- Synthesis & Characterisation techniques
- Nanotechnology for Renewable energy & water treatment
- Nanomaterials for Environment
- Nanotechnology for biomedical applications

27-29 June 2022

Hôtel Monotel Dar El Barka, Nouakchott, Mauritanie

Lectures and Communications Abstracts

List of Participants

First International Workshop on Nanosciences & Nanotechnology

IWNN 2022

27-29 June 2022

Hôtel Monotel Dar El Barka,

Nouakchott, Mauritanie

Sponsored by

U.N.A.

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Faculté des Sciences et Techniques

Lectures and Communications Abstracts

List of Participants

IWNN 2022 : Short Program

Lundi 27/06/2022		
08h30-09h00	Inscription des participants	
09h00-09h30h	Ouverture officielle	
09h30-10h00	Pause café	
10h00-10h40	**Conférence plénière 1: Mohamed Henini** *School of Physics and Astronomy, University of Nottingham, Nottingham NG7 2RD, UK*	
10h40-11h20	**Conférence plénière 2 : Aliou Hamady BARRY** *FST, University of Nouakchott Al Aasriya, Mauritania*	
11h20-11h40	**CO 1: Khalidou Ba** *FST, University of Nouakchott Al Aasriya, Mauritania*	
11h40-12h00	**CO 2 : Khaled Ebeid** *FST, University of Nouakchott Al Aasriya, Mauritania*	
12h00-12h40	**Conférence plénière 3 : Lassaad EL MIR** *FSG, Gabès University, Tunisia.*	
12h40-14h40	**Déjeuner**	
14h40-15h20	**Conférence plénière 4 : Guillaume Viau** *Laboratoire de Physique et Chimie des Nano-Objets, Université de Toulouse, INSA, Toulouse*	
15h20-15h40	**CO 3: Issa El-Heda** *FSS, University of Sfax, Tunisia*	
15h40-16h00	**CO 4: Aichata Kane** *FST, University of Nouakchott Al Aasriya, Mauritania*	
16h00-16h30	**Pause café**	
16h30-17h10	**Conférence plénière 5 : Yareb Ahmed** *FST, University of Nouakchott Al Aasriya, Mauritania*	
Mardi 28 Juin 2022		
09h00-09h40	**Conférence plénière 6 : Teyeb Ould Ely** *Chemical Engineering Department, University of California, Santa Barbara, USA*	
09h40-10h00	**CO 5 : Mohamed Ould Salem** *Institut de Recerca en Energia de Catalunya (IREC), Barcelona, Spain*	
10h00-10h20	**CO 6 : Ahmed Ould Saleck** *FST, University of Nouakchott Al Aasriya, Mauritania*	
10h20-11h00	Pause café	
11h00-11h40	**Conférence plénière 7 Ahmadou Wagué** *University Cheikh Anta Diop, Dakar, Senegal*	
11h40-12h20	**Conférence plénière 8 : M. A. Sanhoury** *FST, University of Nouakchott Al Aasriya, Mauritania*	
12h20-12h40	**CO 7: Mohamed Cheik** *Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, Morocco*	
12h40-13h00	**CO 8: Mané Seck** *Université Gaston, Berger Saint-Louis, Sénégal*	
13h00-14h40	**Pause déjeuner**	
14h40-15h20	**Conférence plénière 9 : Mohamed Abdellah Lemine Kerim** *College Of Sciences, Imam Mohammad Ibn Saud Islamic University (IMISU), Saudi Arabia*	
15h20-15h40	**CO 9 : Ely Cheikh S'Id** *FST, University of Nouakchott Al Aasriya, Mauritania*	
15h40-16h20	**CO 10: Fatimetou Welatta** *Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, Morocco*	
16h20-16h50	**Pause café**	
16h50-17h30	**Conférence plénière 10 : Yaghoub Soumaré** *FST, University of Nouakchott Al Aasriya, Mauritania*	
20h00	**Diner gala**	
Mercredi 29/6/2022		
	Tutorials	
08h30-10h30	**Commun Session (**Salle des Conférences**)**	
	Mohamed Hanini *School of Physics and Astronomy, University of Nottingham, Nottingham, UK*	
10h30-11h00	**Pause café**	
11h00-13h00	**Parallel Sessions**	
	Chemistry and Biology (Lecture Theater A**)**	**Physics (**Lecture Theater B**)**
	Teyeb Ould Ely *University of California, Santa Barbara, USA*	**Mohamed Abdellahi Kerim** *Imam Mohammad Ibn Saud Islamic University, Riyadh, KSA*
	Med Abderrahmane Sanhoury *FST, University of Nouakchott Al Aasriya, Mauritania*	**Lassaad EL MIR** *Gabes University, Gabès, Tunisia.*
Clôture		

Mot de Bienvenue

La Faculté des Sciences et Techniques de l'Université de Nouakchott Al Aasriya (UNA) a l'honneur d'organiser le premier Workshop International sur les Nanosciences et Nanotechnologie (IWNN 2022), auquel vous avez été conviés et pour lequel vous avez bien voulu nous honorer de votre présence. Permettez-moi de vous souhaiter au nom du comité d'organisation et en mon nom personnel la bienvenue parmi nous à Nouakchott. Ce Workshop est la première manifestation du genre organisée en Mauritanie et dans la sous-région, c'est dire toute l'importance qu'il revêt pour nos institutions. Il enregistre la participation de plusieurs intervenants d'origine diverse à savoir des collègues africains, européens ou américains du nord ainsi que des universités et instituts mauritaniens. Plusieurs dizaines de participants venant de différents pays frères ont été invités à apporter leur contribution en participant aux débats pour la réussite de cette édition. Les participants débattront aussi bien en plénière qu'en ateliers autour de différents thèmes tels que la synthèse et les techniques de caractérisation ; la nanotechnologie des énergies renouvelables, du traitement des eaux et des applications médicales ; les nanomatériaux au service de l'environnement. Il sera aussi question au cours des échanges des tutoriales, pour les étudiants inscrits en thèse et en masters, relatifs à l'aspect de quelques techniques expérimentales d'analyse dans le domaine des nanosciences. Les différents thèmes seront traités au cours de 10 conférences en plénières, à travers 10 communications orales et cinq conférences thématiques sous formes de tutoriales.

Je ne pourrai finir sans remercier les conférenciers qui ont bien voulu nous honorer de leur présence à travers des conférences d'un haut niveau scientifique, contribuant ainsi à la réussite de ce séminaire. Je vous souhaite plein succès à vos travaux et un agréable séjour en Mauritanie.

Pr Mohamed Said Mohamed Sidya

Doyen de la Faculté des Sciences et Techniques

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1st International Workshop on Nanosciences & Nanotechnology

27-29 June 2022
Hôtel Monotel Dar El Barka, Nouakchott, Mauritanie

IWNN 2022 Program

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08h30 - 09h00	**Inscription des participants**	
09h00 - 09h30	**Ouverture officielle**	
09h30 - 10h00	**Pause café**	
10h00 - 10h40	**Conférence plénière 1: Mohamed Henini** *School of Physics and Astronomy, University of Nottingham, Nottingham NG7 2RD, UK* mohamed.henini@nottingham.ac.uk **Development of Advanced Semiconductor Materials and Devices For Next Generation Photovoltaics: Opportunities And Challenges**	*Président :* Mohamed Vadel Deida
10h40 - 11h20	**Conférence plénière 2: Aliou Hamady BARRY** *Chemistry department, Faculty of Sciences and Technics, Nouakchott AlAsriya University* barryaliouhamady@ymail.com **Nanostructured Cobalt : Elaboration, Microstructural characterizations and physical properties**	*Président :* Guillaume Viau
11h20 - 11h40	**CO 1: Khalidou Ba** *FST, UNA; Nouakchott, Mauritanie* **Preparation and characterization of phosphate-nickel-titanium composite coatings obtained by sol–gel process for corrosion protection**	
11h40 - 12h00	**CO 2: Khaled Ebeid** *FST, UNA; Nouakchott, Mauritanie* **Preparation of phosphine oxide-capped ME nanoparticles (M = Cd, Hg ou Zn ; E = S ou Se) from the complexes [$MCl_2(Pyrr_3PE)_2$] as single source precursors**	
12h00 - 12h40	**Conférence plénière 3: Lassaad EL MIR** *Laboratory of Physics of Materials and Nanomaterials Applied at Environment (LaPhyMNE), Gabès University, 6072 Faculty of Sciences of Gabès, Gabès, Tunisia.* lassaad.elmir@fsg.rnu.tn **Nanomaterials and nanocomposites for advanced technological applications**	*Président* Mohamed Abdellah Lemine Kerim
12h40 - 14h40	**Déjeuner**	

Lundi 27/06/2022		
14h40 - 15h20	**Conférence plénière 4: <u>Guillaume Viau</u>** *Laboratoire de Physique et Chimie des Nano-Objets, Université de Toulouse, INSA, 135 av de Rangueil 31077 Toulouse Cedex 4* gviau@insa-toulouse.fr **Nucleation, growth and integration of metal nanorods and nanowires**	*Président :* Chamekh M'Bareck
15h20 - 15h40	**CO 3: Issa El-Heda** *Physics Department, Faculty of Sciences of Sfax, University of Sfax, Sfax, Tunisia* **Study of the structural properties and conduction mechanisms of chromite spinel $Co_0.5Fe_2.5O_4$**	
15h40 - 16h00	**CO 4: Aichata Kane** *FST, UNA; Nouakchott, Mauritanie* **One-Step Synthesis of Graphene, Copper and Zinc Oxide Graphene Hybrids via Arc Discharge**	
16h00-16h30	**Pause café**	
16h30 - 17h10	**Conférence plénière 5: <u>Yareb Ahmed</u>** *Physic department, Faculty of Sciences and Technics, Nouakchott AlAsriya University* **Les nanotechnologies dans le domaine de l'électronique**	*Président :* Mohamed Henini

Mardi 28 Juin 2022		
09h00 - 09h40	**Conférence plénière 6: <u>Teyeb Ould Ely</u>** *Chemical Engineering Department, University of California, Santa Barbara, USA* **Scaling-up Nanomaterials for Energy Storage Applications**	*Président :* Ahmed El Mouna
09h40 - 10h00	**CO 5: Mohamed Ould Salem** *Institut de Recerca en Energia de Catalunya (IREC), Barcelona, Spain* **Advanced strategies for high efficiency Ga-rich Cu(In,Ga)Se_2 Solar Cells onto transparent substrates**	
10h00 - 10h20	**CO 6: Ahmed Ould Saleck** *FST, University of Nouakchott Al Aasriya, Mauritania* **Synthèse par voie hydrothermale, sol-gel et par diffusion à l'état solide**	
10h20 - 11h00	Pause café	
11h00 - 11h40	**Conférence plénière 7: <u>Ahmadou Wagué</u>** *President of African Physical Society* *National Academy of Sciences and Techniques of Senegal, University Cheikh Anta Diop, Dakar-Senegal* Ahmadou.wague@ucad.edu.sn **Laser Led and Optical Spectroscopic instrumentations: Contribution for The Development of Optical Sciences and Applications in Africa**	*Président :* Taybe Mohammed Mahmoud
11h40 - 12h20	**Conférence plénière 8: <u>M. A. Sanhoury</u>** *Materials Chemistry Research Uni, Chemistry Departmenet, Facukty of Sciences and Techniques, University of Nouakchott Al Aasiya, Nouakchott, Mauritania* **Preparation of metal chalcogenide nanoparticles with different caping agents and their use in hybrid organic-inorganic solar cells**	*Président :* Teyeb Ould Ely
12h20 - 12h40	**CO 7: Mohamed Cheik** *Faculty of Sciences Semlalia, Cadi Ayyad, University, Marrakech, Morocco* **Optical and Structural Properties of RF-sputtered ZnS:Ni thin films**	
12h40 - 13h00	**CO 8: Mané Seck** *Département de physique appliquée, UFR de sciences appliquées et de technologies, Université Gaston, Berger Saint-Louis, Sénégal* **Low voltage organic transistors using almond gum-a natural, biodegradable and biocompatible polymer dielectric**	
13h00 - 14h40	**Pause déjeuner**	

Mardi 28 Juin 2022		
14h40 - 15h20	**Conférence plénière 9: Mohamed Abdellah Lemine Kerim** *Magnetic Nanoparticles Research Group, Physics department, College Of Sciences Imam Mohammad Ibn Saud Islamic University (IMISU), Saudi Arabia* **Magnetic Nanoparticles For Hyperthermia Cancer Treatment**	*Président* Mohamed Said Mohamed Sidya
15h20 - 15h40	**CO 9: Ely Cheikh S'Id** *FST, University of Nouakchott Al-Aasriya, Mauritania.* **Kinetic adsorption of methylene blue using synthesized polymeric membranes**	
15h40 - 16h20	**CO 10: Fatimetou Welatta** *Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, Morocco* **Fabrication of Cu_2SnS_3 thin films by Sol Gel for solar cells**	
16h20 - 16h50	**Pause café**	
16h50 - 17h30	**Conférence plénière 10: Yaghoub Soumaré** *Chemistry department, Faculty of Sciences and Technics, Nouakchott AlAsriya University* **Le Procédé Polyol : Une Technique De Synthèse Simple De Nanoparticules Magnétiques Anisotropes A Fort Potentiel**	*Président* Lassaad EL MIR
20h00	**Diner gala**	

Mercredi 29/6/2022		
	Tutorials	
08h30 - 10h30	**Commun Session (**Salle des Conférences**)**	
	Electric Properties of Semiconductors Nanostructures. **Mohamed Hanini** *School of Physics and Astronomy, University of Nottingham, Nottingham NG7 2RD, UK*	
10h30 - 11h00	**Pause café**	
11h00 - 13h00	**Parallel Sessions**	
	Chemistry & Biology (Lecture Theater A**)**	**Physics (**Lecture Theater B**)**
	Nanoscale Materials: Advanced Synthesis and Manufacturing Techniques **Teyeb Ould Ely** *Chemical Engineering Department, University of California, Santa Barbara, USA, CA 93106-5080, USA*	**Structural Characterization of Nanomaterials** **Mohamed Abdellahi Kerim** *Physics Department,* *Imam Mohammad Ibn Saud Islamic University, Riyadh, KSA*
	Metal Chalcogenide Nanoparticle Synthesis **Med Abderrahmane Sanhoury** *Chemistry Department, Faculty of Sciences and Techniques, UNA, Nouakchott, Mauritania*	**Optical Properties of Nanomaterials** **Lassaad EL MIR** *Laboratory of Physics of Materials and Nanomaterials Applied at Environment,* *FST Gabès, Gabès University, Gabès, Tunisia.*
13h00	**Clôture**	

Lectures' Abstracts

Development of Advanced Semiconductor Materials and Devices For Next Generation Photovoltaics: Opportunities And Challenges

Mohamed Henini

School of Physics and Astronomy, University of Nottingham, Nottingham NG7 2RD, UK
mohamed.henini@nottingham.ac.uk

Abstract:
Renewable energy production is a key component in the drive towards a safe, secure energy supply for future low-carbon economies. Using energy from the sun to generate electricity provides a sustainable source of free, abundant, safe, clean energy, without use of any fossil fuels and without waste or pollution.
Solar cells (photovoltaic cells) are made of semiconductor materials that convert energy from the sun directly into electrical energy. Sunlight consists of a spectrum of different wavelengths (colours) of light, each corresponding to a different energy level. Semiconductor materials can only convert sunlight of specific wavelengths and energy into electrical energy. Remaining energy from the sun is lost. Existing semiconductors cannot utilise the entire spectrum distribution of sunlight. The strategy to increase the efficiency of solar cells is to use semiconductors optimised for different wavelength ranges of the spectrum.
Existing 'three junction' solar cells, which use three different semiconductors, are capable of converting sunlight from three regions of the spectrum into electrical energy. The drawback is that state of the art solar cells currently only convert 33% of solar energy into electricity. There is a great interest worldwide into developing innovative semiconductor materials capable of converting sunlight from a fourth specific portion of the solar spectrum into electrical energy. Retrofitting this fourth generation material onto current solar cells should significantly improve solar cell efficiency to >60%.
Currently a wide range of semiconductors is explored for their potential use in photovoltaic applications. However, solar cells are already an important part of our lives. The simplest systems power many of the small calculators and wristwatches. The complicated systems provide electricity for pumping water, powering communications equipment, and even lighting our homes and running our appliances. With the growth of the satellite industry and the increase of power requirements, larger solar arrays are needed to produce the required power. The familiar wings of most modern satellites are made of solar arrays.

Short biography:
Mohamed Henini obtained his first degree at the University of Oran, Algeria. He went to Nottingham University and was awarded the PhD degree in 1984. Mohamed has over 25 years of experience in Molecular Beam Epitaxy (MBE) growth. His particular speciality is the physics and technology of MBE growth for III-V electronic and optoelectronic devices. He has authored and co-authored over 970 papers in international journals and conference proceedings. He has an h-index of 53.
He is the founder of two international conferences namely, Low Dimensional Structures and Devices (LDSD) and Epitaxial Semiconductors on Patterned Substrates and Novel Index Surfaces (ESPS-NIS). He edited six books which were published by Elsevier and serves on the Editorial Board of several scientific journals. He is Editor of Journal of Alloys and Compounds (Elsevier).

http://www.nottingham.ac.uk/~ppzmh/mywebsite/
For more information: https://scholar.google.com/citations?hl=en&user=tGnnRZgAAAAJ

Nanostructured Cobalt : Elaboration, Microstructural characterizations and physical properties.

Aliou Hamady BARRY

Chemestry department, Faculty of Sciences and Technics, Nouakchott AlAsriya University
Email: barryaliouhamady@ymail.com

In this work, two types of nanostructured Cobalt (Co nanoparticles and Co nanorods) were prepared and studied separately. Co nanoparticles of the average particle size of about 50 nm were synthesized by reduction in polyol medium of $Co(CH_3COO)_2.4H_2O$ acetate using PtK_2Cl_4 as nucleating agent. Subsequently, the as-obtained Co nanoparticles was sintered using the spark plasma sintering (SPS) technique, in order to obtain densified materials. The optimum sintering time was identified and determined at around 25 min, at a temperature of 650°C.

References :

1. Microstructure and Mechanical Properties of bulk highly faulted fcc/hcp nanostructured cobalt microstructures. **Aliou Hamady Barry**, Guy Dirras, Frederic Schoenstein, Florent Tétard and Noureddine Jouini. Materials Characterization 91 (2014) 26-33.

2. Enhanced Magnetic Behavior of Cobalt Nano-Rods Elaborated by the Polyol Process Assisted with an External Magnetic Field. Mohamed Ali Bousnina, Amel Dakhlaoui-Omrani, Frédéric Schoenstein, **Yaghoub Soumare**, **Aliou Hamady Barry**, Jean-Yves Piquemal, Guillaume Viau, Silvana Mercone, and Noureddine Jouini. *Nanomaterials **(2020)**, 10, 334*.

3. Fellah F, Dirras G, Gubicza J, Schoenstein F, Jouini N, Cherifa SM, et al. Microstructure and mechanical properties of ultrafine-grained fcc/hcp cobalt processed by a bottom-up approach. J Alloys Compd 2010;489:424–8.

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Nanomaterials and nanocomposites for advanced technological applications

Lassaad EL MIR

Laboratory of Physics of Materials and Nanomaterials Applied at Environment (LaPhyMNE),

Gabes University, 6072 Faculty of Sciences in Gabes, Gabes, Tunisia.

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Abstract:

Development of systems based on nanoscaled materials have recently received much attention due to their novel optical, electrical and magnetic properties. Confining one or more dimensions to the nanometer scale, physical properties of such materials exhibit dramatic changes. Those materials exhibit intermediate behaviour between a bulk crystals and isolated molecules. In the nanoparticles, there is a strong spatial delocalisation of valence electrons, and therefore a small crystallite must grow fairly large to achieve the limiting bulk electronic structure. The intermediate-size clusters can have unique properties, characteristic of neither the molecule nor solid state limits. The main objective of this conference is to present our laboratory results in the field of synthesis and characterisation of nanoparticles, nanocomposites, thin films and electrically conductor nanoporous carbon reached by inorganic nanoparticles synthesized by a new protocol based on sol-gel technique. These materials are used in a verity of technological applications like energy storage, gas sensing, hyperthermia, solar cells, opto-electronic devices and electronic components. Some examples of multifunctional materials based on sol-gel technique will be presented.

Short biography:

He completed his PhD in 1995 from Faculty of Sciences in Tunis in collaboration with the University of Paris VI in the field of electronic transport in semiconductors and his "HDR" (Ability of Direction of Research) in 2007 from College of Sciences in Sfax (Tunisia) in the field of nanotechnology. He is Director of the Laboratory of Physics of Materials and Nanomaterials applications at Environment: LaPhyMNE". He has published more than 240 research articles and he has more than 230 contributions in national and international conferences. He is reviewer in some journals as Thin Solid Films, Materials Science and Engineering B, Journal of Physics and Chemistry of Solids and Journal of Luminescence. He was a supervision of 30 PhD students. He spent seven years (October 2011- Jun 2018) as Visitor Professor in the College of Sciences at Al-Imam Mohamed Ibn Saud Islamic University, (Saudi Arabia). His main research interest: synthesis and characterization of nanoparticles, thin films and nanocomposites for variety of applications such as visible luminescence thermometry, solar cells, transparent electrodes, advanced catalyst supports, Hyperthermia, water treatment, energy storage, gas sensors and electronic components.

Fore more information: https://scholar.google.com/citations?hl=en&user=kxgdiXoAAAAJ

Nucleation, growth and integration of metal nanorods and nanowires

Guillaume Viau

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During the last two decades wet-chemistry methods have accomplished considerable progress in the synthesis of metal nanoparticles (NPs) with controlled morphology for applications in different fields such as catalysis, plasmonics, electronics or magnetism. The control of the crystalline structure, shape and surface chemistry is the key to control their physical and chemical properties. 1D NPs such as nanorods and nanowires are a particular class of NPs presenting original properties thanks to their high anisotropy. As building blocks for original nanostructured materials, their integration into electronic/magnetic devices requires a good control of their assembly.

This presentation will focus on two examples of anisotropic metal particles with controlled length and diameter, cobalt nanorods (NRs) and ultrathin gold nanowires (NWs). In the case of Au NWs, the combination of *in situ* small and wide angles X-ray scattering with *ex situ* high resolution electron microscopy (HRTEM) and X-ray photoelectron spectroscopy (XPS) evidenced the role of surfactants on the nucleation and growth stages [1]. It revealed also an unexpected atomic structure of the metal core different from the closed-packed fcc structure of bulk Au [2]. Co NRs have been produced by a seed-mediated growth method [3], the heterogenous nucleation and the growth stages have been recently fully described thanks to *in situ* analysis, theoretical calculations and probe-corrected electron microscopy [4].

Cobalt nanorods (NRs) with optimized magnetic properties thanks to the accurate control of their morphology find application as building blocks for rare-earth free permanent magnets. Dense and parallel assemblies of Co NRs were obtained from concentrated suspensions and were compacted into nanostructured materials with strong magnetization and high magnetic anisotropy [5]. Recently, sub-millimeter magnets have been elaborated using magnetophoresis methods which is a promising way for their integration in electronic devices [6].

References

[1] R. Kumar Ramamoorthy et al., *Nanoscale,* **2020**, *12*, 16173. https://doi.org/10.1039/D0NR03486J
[2] J. A. Vargas et al., *ACS Nano*, **2018**, *12*, 9521. https://doi.org/10.1021/acsnano.8b05036
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[6] P. Moritz et al., *ACS Nano* **2021**, *15*, 5096. https://dx.doi.org/10.1021/acsnano.0c10215

Les nanotechnologies dans le domaine de l'électronique

Aichetoune Oumar[1],Yarba Ahmed[2]

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Abstract: Le présent travail représente une introduction au domaine de la nanotechnologie dans le domaine de l'éléctronique. Le but est de définir ce qu'est la nanotechnologie, citer les differents domaines d'appliations de la nanotechnologie et se focaliser ensuite sur les nano-éléctroniques. La nanoelectronique est la science qui s'intersse à l'etudedes composants éléctroniques à l'echeclle nanometrique.La nanotechnologie a rendu les outils électroniques très légers en plus de la minimisation de consommation de l'énergie, Grace à cela plusieurs dispositives nanoélectronique sont apparu tels que : les nano-transistors, le microscope électronique à balayage, les nano-diodes et d'autres outils informatiques …etc.
A la fin nous présenterons les avantages de la nanoélectronique et on termine par une conclusion.

Références

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Scaling-up Nanomaterials for Energy Storage Applications

Teyeb Ould Ely

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Abstract

The current conflict between Russia and Ukraine and the looming global warming crisis impose rapid electrification of our transportation sectors. As a result, various renewable energies are under intense investigation (wind, solar, batteries, etc.). Lithium-ion batteries, in particular, are receiving a great deal of interest due to their high power and high capacity performances. However, their high cost, slow charging, low safety, and poor efficiency still hamper their large-scale adoption. Furthermore, the raw materials supply chain is strained due to the universal shift to electric transportation. We will discuss our recent attempts to scale-up energy-relevant nanomaterials using our homemade scale-up reactors. Furthermore, we will address the challenges facing the electrification of the worldwide transportation system.

Short biography:

Dr. OULD ELY received his Master's of "Chemistry and Physical Chemistry of Transition Metals" in 1995 from Paul Sabatier University (UPS) and his Ph.D. (on magnetic nanomaterials) in 1998 from CNRS/LCC/UPS (under the supervision of Prof. Bruno Chaudret. Since then, he has carried out several postdoctoral fellowships in Germany with Prof. H. Boennemann at the Max-Planck Institute Fuer Kohlenforschung, in the United Kingdom (with Donna G. Blackmond), and in the US (Rice University, Texas). In 2006 he was employed by Roswell Park Cancer Institute (New York), and in 2008 by the University of California, Santa Barbara (UCSB). While at UCSB, Teyeb worked within the Institute For Collaborative Biotechnologies and the Center for Energy Efficient Materials. Teyeb taught Chemistry at Nazarbayev University (NU-KZ, Astana), was a Guest visiting Professor within the UCSB Chemical Engineering, and iscurrently an academic affiliate within the same department. He is presently working on synthesizing and scaling up energy-relevant advanced nanomaterials.

For more information:https://scholar.google.com/citations?user=-IH21GgAAAAJ&hl=en

Laser Led and Optical Spectroscopic instrumentations: Contribution For The Development Of Optical Sciences and Applications In Africa.

Ahmadou Wagué
President of African Physical Society

National Academy of Sciences and Techniques of Senegal
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Abstract

Here, through the activities of the Atom Laser lab at Cheikh Anta Diop University of Dakar Senegal, and the activities of African Laser Molecular and Optical Sciences Network (LAM Network), we consider , Laser induced absorption and fluorescence spectroscopy together with laser induced breakdown spectroscopy and X-ray fluorescence spectroscopy for environmental monitoring and medical diagnostic and Therapy at atomic scale.

Short biography:

Ph.D in Physico-Mathematical Sciences and Doctorat d 'Etat in Atomic Physics
Full professor of physics with long teaching experiences in Quantum Physics, Atomic physics and subatomic Physics.
Long research Experience in Atomic Physics and Laser Spectroscopy.
Former Director of the Institute of Applied Nuclear Physics at Cheikh Anta Diop University
Specialized in Laser Spectroscopy , Theory of Atomic resonances and Nuclear Security.
Member of the Committee on Committees at American Physical Society
Former member of the Board of Directors and International Councilor at the American Physical Society.
Member and Board member of the National Academy of Science and Techniques of Senegal
President of the LAM Network and Vice President of the International Commission for Optics.
Member of the Trieste Committee on Optical Sciences and Applications at International Centre for Theoretical Physics in Trieste, Italy.

Preparation of metal chalcogenide nanoparticles with different caping agents and their use in hybrid organic-inorganic solar cells

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Laboratory of Structural Organic Chemistry: Synthesis and Physicochemical Studies, Campus Universitaire, University of Tunis El Manar, 2092, Tunis, Tunisia
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Abstract: Blending conjugated polymers (CPs) and metal chalcogenide nanocrystal (NC) semiconductors produces organic−inorganic hybrid solar cells that are increasingly attracting considerable attention as a potential alternative to traditional silicon solar cells[1,2]. This is due to the capacity of such hybrid cells to produce low-cost high efficiency solar energy, which combine advantageous characteristics of CPs and NCs and enable the construction of nanostructured high-performance, lightweight, flexible, large-area, and low cost hybrid solar cells. However, controlling the film morphology and interfacial structure of such organic/inorganic semiconductor blends on the nanoscale remains a major challenge. In this work, we show-case the strategies of bringing CPs and NCs in close contact through modification of surface ligands around the NCs, tailoring the colloidal synthesis and the coordination reaction[3,4]. Such a modification would provide promising opportunities for accurately controlling the phase separation between electron-donating CPs and electron-accepting NCs, increasing the interfacial areas between them, enhancing their electronic interaction and would therefore substantially promote the photovoltaic performance of the resulting organic−inorganic hybrid solar cells. Moreover, the conversion efficiencies of such hybrid cells show a tenfold increase for the hybrid composite containing shorter ligand-capped NCs as compared to pure CPs.

Keywords: ME nanocrystals, Phosphine oxide, Capping agent, Conjugated polymer, Photovoltaic cell.

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Short biography: Med Abderrahmane Sanhoury is currently a lecturer at the Chemistry Departmenet, Faculty of Sciences and Techniques, UNA, Nouakchott, Mauritania and PDRA at the Faculty of Sciences of Tunis, Tunis, Tunisia. His research focuses on the synthesis and coordination chemistry of organophosphorus compounds. He has about 65 publications and is a recipient of the RSC Member Inspirational Award (UK, 2016) and Chinguity prize for Technical Sciences (Mauritania, 2016).

Magnetic Nanoparticles For Hyperthermia Cancer Treatment

Mohamed Abdellah Lemine Kerim

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Abstract

Magnetic nanoparticles(MNPs) attract increasing attention due to their immense broad range of applications such as photocatalysis, photonic, magnetic storage and biomedical. Among these applications in nanomedecine is their utilization in magnetic fluid hyperthermia (MFH), which is a cancer treatment method using the heat dissipated by magnetic NPs under an alternating magnetic field to kill the cancerous cells. Generally, the heating efficiency of the magnetic nanoparticles in the presence of an AC magnetic field is defined by specific absorption rate (SAR) which is the amount of heat generated per unit gram of magnetic material and per unit time. It is reported that the SAR could be affected by several parameters such as sample preparation method, structural and magnetic properties of the nanoparticles, the amplitudes and frequency of the applied field, among others.

In this talk, I will give an overview of the principles of magnetic hyperthermia, the mechanism of heat dissipation by MNPs, the properties of MNPs suitable for magnetic hyperthermia, and some selected recent achievements by our group in the use of iron oxides nanoparticles for cancer cells treatment.

Short biography:

Mohamed A Lemine is currently working as a professor of physics at Al Imam University in Riyadh, Saudi Arabia. Prior to his faculty position at Al Imam University, he was a faculty member at King Khalid University (Saudi Arabia), Picardie University (France) and Lorraine University (France).He received his Ph.D. in Materials Physics (1999) and M.S. degree in Materials Sciences and engineering (1995) from Lorraine University (France). Current research interests touch all aspect of magnetic nanomaterials; these include, but not limited to, magnetic nanoparticles, diluted magnetic semiconductors and magnetic thin film. Mohamed A Lemine is research group leader and founder of research experimental laboratory at the college of science at Al Imam University (KSA).

Mohamed A Lemine is the recipient of numerous awards including the Chinguitt Award for Sciences and Technologies in 2012 (Mauritania), awards for the international publications record at Al imam University (2012-2021), the best paper award at the college of sciences in 2012, distinguished Scholar Award (AFESD, Kuwait) in 2010 and graduate fellowship from French Ministry of Education in 1995.

He has a considerable experience in securing external fund (More than 1 million euro), managing research projects, supervising students and teaching. To date he is authored or co-authored more than 70 reviewed journal articles in high impact journals and contributed also to four book chapters with others colleagues.

For more information: https://scholar.google.com/citations?user=2yKj_iwAAAAJ&hl=en&oi=ao

LE PROCEDE POLYOL UNE TECHNIQUE DE SYNTHESE SIMPLE DE NANOPARTICULES MAGNETIQUES ANISOTROPES A FORT POTENTIEL

Dr SOUMARE YAGHOUB

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Des nanoparticules magnétiques anisotropes ont été préparées par chimie douce par réduction de précurseurs carboxylate de cobalt(II) et de nickel(II) dans une solution basique de 1,2-butanediol à 170°C à l'aide d'une nucléation hétérogène. En utilisant des précurseurs acétate, des nanofils de $Co_{80}Ni_{20}$ présentant un diamètre moyen de 8 nm et une longueur moyenne de plus de 200 nm ont été obtenus. L'utilisation de nouveaux précurseurs carboxylate préparés au laboratoire a conduit à isoler des nanobâtonnets de cobalt avec un diamètre moyen de 20 nm et une longueur moyenne de 100 nm. De plus, le rapport d'aspect (longueur moyenne / diamètre moyen) de ces objets peut être contrôlé à l'aide des différents paramètres réactionnels que sont la nature du précurseur métallique, la basicité du milieu ou encore la rampe de montée en température. Les nanofils de $Co_{80}Ni_{20}$ et nanobâtonnets de cobalt cristallisent principalement dans la phase hexagonale compacte avec l'axe de croissance c parallèle à l'axe c du système hexagonal. Ces nanomatériaux sont ferromagnétiques et présentent un champ coercitif, pouvant dépasser 5 kOe, à température ambiante. Les courbes d'aimantation mesurées sur des assemblées de nanofils et nanobâtonnets alignés parallèlement à l'aide d'un champ magnétique extérieur présentent une aimantation rémanente proche de l'aimantation à saturation. Ces résultats caractéristiques de matériaux magnétiques durs permettent d'envisager leur utilisation de ces nanofils et nanobâtonnets comme briques élémentaires pour la préparation d'une nouvelle famille d'aimants permanents.

Mots-clef : nanomatériaux, cobalt, nickel, procédé polyol, ferromagnétisme, aimants permanents.

Oral Communications' List

Nr.		Ref
01	**Ba Khalidou**, A. Chahine, M. Ebn Touhami, J. G. Alauzun *FST, UNA, Nouakchott, Mauritania* Preparation and characterization of phosphate-nickel-titanium composite coatings obtained by sol–gel process for corrosion protection	**OC 1**
02	**Ebeid Khaled**, F. Ebnou, M. Mhaiham, A. Benchaabane, M.T. Ben Dhia, M.A.K. Sanhoury *FST, UNA, Nouakchott, Mauritania* Preparation Of Phosphine Oxide-Capped ME Nanoparticles (M = Cd, Hg ou Zn ; E = S ou Se) From The Complexes [MCl2(Pyrr3PE)2] As Single Source Precursors	**OC 2**
03	**El-Heda Issa**, E. Dhahri *FSS, University of Sfax, Tunisia* Study of the structural properties and conduction mechanisms of chromite spinel Co0.5Fe2.5O4	**OC 3**
04	**Kane Aichata**, S. M. Cherif, A. Hamady Barry, S. Farhat *FST, UNA, Nouakchott, Mauritania* One-Step Synthesis of Graphene, Copper and Zinc Oxide Graphene Hybrids via Arc Discharge	**OC 4**
05	**Ould Salem Mohamed**, A. Thomere, R. Fonoll-Rubio, Diouldé Sylla, Yudania Sanchez, E. Saucedo, V. Izquierdo-Roca, Boudy B., A.P. Rodríguez, Z. J. Li-Kao, M. Placidi *Institut de Recerca en Energia de Catalunya, Barcelona, Spain* Advanced strategies for high efficiency Ga-rich Cu(In,Ga)Se_2 Solar Cells onto transparent substrates	**OC 5**
06	**Ould Saleck Ahmed** *FST, UNA, Nouakchott, Mauritania* Synthèse par voie hydrothermale, sol-gel et par diffusion à l'état solide	**OC 6**
07	**Cheik Mohamed**, C.M. Samba Vall, C.S.E. Kane, M. Aggou, A. Outzourhit *Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, Morocco* Optical and Structural Properties of RF-sputtered ZnS:Ni thin films	**OC 7**
08	**Seck Mané**, N. Mohammadian, A. K. Diallo, S. Faraji, M. Erouel, N. Bouguila, D. Ndiaye, K. Khirouni, L.A. Majewski *UFR de sciences appliquées et de technologies, Université Gaston, Berger Saint-Louis, Sénégal* Low voltage organic transistors using almond gum-a natural, biodegradable and biocompatible polymer dielectric	**OC 8**
09	**Cheikh S'Id Ely**, M. Degué, C. Khalifa, A. Sbai, E. Cheikh Moine, A. M. Lemine, C. M'Bareck *FST, UNA, Nouakchott, Mauritania* Kinetic adsoption of methylene blue using synthetized polymerics membranes	**OC 9**
10	**Welatta Fatimetou**, A. El kissani, D. Ait El Haj, A. Agdad, M. El Yaakoubi, M. Aggour, A. Outzourhit *Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, Morocco* Fabrication of Cu_2SnS3 thin films by Sol Gel for solar cells	**OC 10**

Oral Communications' Abstracts

Program of
Monday
27 June 2022

Preparation and characterization of phosphate-nickel-titanium composite coatings obtained by sol–gel process for corrosion protection

Khalidou Ba[1,2 *] · Abdelkrim Chahine[2] · Mohamed Ebn Touhami[2] · Johan G. Alauzun[3] ·

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Abstract: The aim of the present work is to develop of a new sol–gel synthesis route for new phosphorus–titanium–nickel composites deposited on steel substrate using sol gel spin coating technique for application as anticorrosion coatings. Titanium tetra-isopropoxide, tri-methyl phosphate and nickel(II) nitrate hexahydrate were used as precursors. To characterize the coatings and powder, various techniques were used: ATG/DSC, FTIR, DRX, SEM with Energy Dispersive X-ray (EDX) analysis, elemental analysis, ICP and XPS. The results of the study revealed that the annealing temperature at 450 °C and after six layers had a great impact on the anticorrosion properties of 57.5TiO2–12.5NiO–30P2O5 composite.

Keywords: Sol–Gel coating · X-ray photoelectron spectroscopy · Fourier transform infrared spectroscopy, Scanning electron microscopy, Anticorrosion

Preparation Of Phosphine Oxide-Capped ME Nanoparticles (M = Cd, Hg ou Zn ; E = S ou Se) From The Complexes $[MCl_2(Pyrr_3PE)_2]$ As Single Source Precursors

Khaled Ebeid,[1,2] F. Ebnou,[1,2], M. Mhaiham,[1,2] A. Benchaabane,[3]
M.T. Ben Dhia,[2] M.A.K. Sanhoury, [1,2*]

[1)] *Unité de recherche de chimie des matériaux, Faculté des Sciences et Techniques, Nouakchott, Mauritanie*
[2)] *Laboratoire de chimie organique structurale : Synthèse et Etudes physicochimiques, groupe de chimie de coordination, Département de chimie, Faculté des Sciences de Tunis, Campus universitaire El Manar I 2092, Tunis, Tunisie*
[3)] *Laboratoire Matériaux avancées et phénomènes Quantiques, Faculy of Sciences of Tunis, Campus Universitaire, University of Tunis El-Manar, 2092, Tunis, Tunisia*
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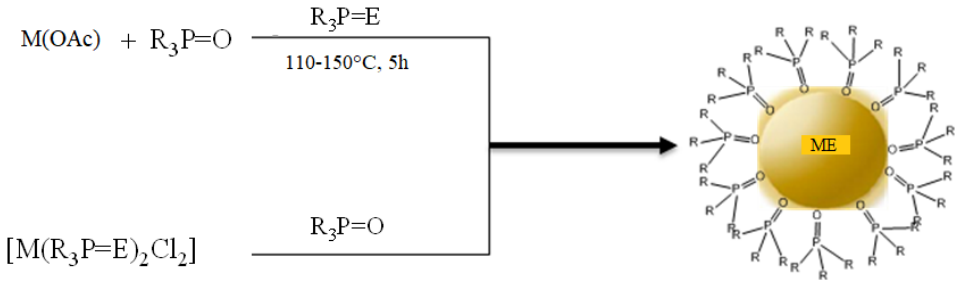
Abstract: Phosphine chalcogenides R_3PE (E = O, S, Se) and related compounds are attracting much attention due to their easy preparation, high solubility, and good reactivity toward different metal ions in many organic solvents [1–3]. Importantly, there has been a renewed interest in the coordination chemistry of this class of compounds in view of their increasing use as suitable single-source precursors for the production of binary metal chalcogenide thin films ME (M = Zn, Cd or Hg; E = S, Se or Te) as well as ME quantum dots [4, 5]. Recently, we have prepared and characterized new complexes of zinc(II), cadmium(II), and mercury(II) with the ligands $Pyrr_3PE$ (Pyrr : pyrrolidinyl ; E = S or Se) [6]. In this presentation, we describe the synthesis of phosphine oxide-capped nanoparticles starting from these complexes as single source precursors. These nanoparticles were characterized using UV-visible, PL, X-rays powder and NMR techniques. The synthetic method was compared to conventional procedures.



Keywords: Aminophosphinechalcogenides, nanoparticles, mercury, zinc, cadmium, UV-Vis, NMR, X-rays.

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Study of the structural properties and conduction mechanisms of chromite spinel $Co_{0.5}Fe_{2.5}O_4$

Issa El-Heda[1], Essebti Dhahri[1]

[1]*Physic department, college of sciences of Sfax, University of Sfax*
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Abstract:
The synthesis of $Co_{0.7}Mn_{0.3}Fe_{0.5}Cr_{1.5}O_4$ nanoparticles was carried out using the Sol-Gel method in order to study their structural and electrical properties. The X-ray diffractogram analysis shows the formation of spinel nanoparticles with a face-centred cubic structure and a space group Fd-3m. The grain size was estimated based on the SEM micrograph using ImageJ. Grain size is in the order of crystallite size, indicating the monocrystalline (single domain) nature of the grains. The two absorption bands below 1000 cm^{-1} in the infrared transmittance spectrum are attributed to stretching vibrations in the tetrahedral and octahedral sites.The electrical analysis shows that the conductivity varies according to the classical Joncher's law in the temperature range [420-660K]. The conduction mechanisms are dominated by the correlated barrier hopping (CBH) model. The Nyquist diagram fitting by Zview software reveals that this sample can be modelled by two parallel circuits representing the grains and the grain boundaries.

Keywords:chromite spinels, Sol-Gel method, structural properties , conduction mechanisms

One-Step Synthesis of Graphene, Copper and Zinc Oxide Graphene Hybrids via Arc Discharge

Aichata Kane[1,2], Salim Mourad Cherif[2], Aliou Hamady Barry [1], Samir Farhat [2*]

[1]*Laboratoire de chimie des matériaux (LCM), Département de chimie, college, Université de Nouakchott ALAasriya*
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Abstract:
A modified arc process was used to synthetize graphene, copper and zinc oxide graphene hybrids. The anode was made of pure graphite or graphite mixed with metals or metal oxides. Continuous and abundant flux of small carbon, zinc or copper species, issued from the anode, condensates in the vicinity of a water-cooled cathode leading to few-layered graphene sheets and highly ordered carbon structures. When the graphite rod is filled with copper or zinc oxide nanoparticles, few layers of curved graphene films were anchored with spherical Cu and ZnO nanoparticles leading to a one-step process synthesis of graphene hybrids.

***Keywords*:** Graphene, Hybrides, arc discharge.

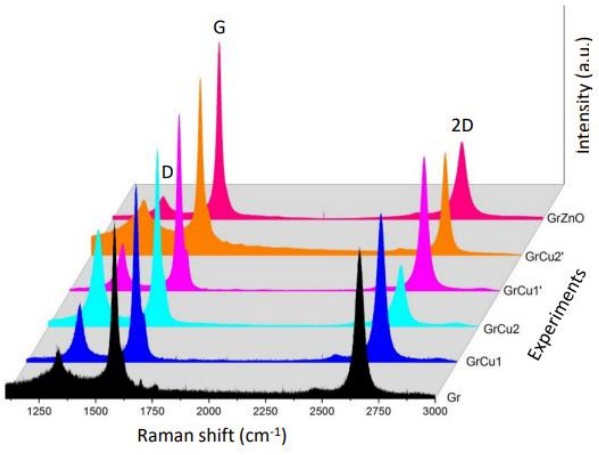

Fig.1 Raman spectra of the synthesized graphene and graphene hybrids in the helium arc discharge method

Program of
Tuesday
28 June 2022

Advanced strategies for high efficiency Ga-rich Cu(In,Ga)Se_2 Solar Cells onto transparent substrates

Mohmed Ould Salem1, Angelica Thomere 1, Robert Fonoll-Rubio 1, Diouldé Sylla1, Yudania Sanchez1, Edgardo Saucedo2, Victor Izquierdo-Roca 1, Boudy Bilal 4, Alejandro PérezRodríguez1,3, ZacharieJehl Li-Kao 2, and Marcel Placidi1,2.

1 Institut de Recerca en Energia de Catalunya (IREC), Jardins de les Dones de Negre 1 2pl, 08930 Sant Adrià de Besòs, Barcelona, Spain.
2 Departament d'EnginyeriaElectrònica, UniversitatPolitècnica de Catalunya, Eduard Maristany 16, Campus Besòs, 08930 Sant AdriàdelBesòs, Barcelona, Spain.
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Abstract: Among wide band gap thin film chalcogenide (WBG) materials, Ga-rich chalcopyrite Cu(InGa)Se2 (CIGSe) is considered one of the best candidates as top cell for tandem device applications. However, preparation of the materials on transparent substrates is required, being considered one of the main challenges for the manufacturing of highly efficient tandem solar cells using this technology. We recently reported on WBG CIGSe solar cells (70% Ga) on transparent substrate using a sodium predeposition treatment technique with efficiency over 10 %. Here we will present the latest results achieved using advanced strategies for the development of Ga-rich chalcopyrite devices onto transparent substrates.

Keywords: Ga-rich Cu(In,Ga)Se2, Transparent substrate, Alkali treatment, Tandem solar cells.

Synthèse par voie hydrothermale, sol-gel et par diffusion à l'état solide

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[2]*Laboratoire de Chimie Appliquée des Matériaux, Centre des Sciences des Matériaux, Faculty of Science, Mohammed V University in Rabat, Avenue Ibn Batouta, BP 1014, Rabat, Morocco*
[3] *Univ. Polytechnique Hauts-de-France, INSA Hauts-de-France, CERAMATHS Département Matériaux et Procédés, F-59313 Valenciennes, France*
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En chimie, plusieurs méthodes de synthèses ont été proposées par les chercheurs pour synthétiser les composés chimiques tels que : la synthèse hydrothermale, la synthèse par voie sol-gel et la synthèse par diffusion à l'état solide.
Le phosphate $PbMg_3(HPO_4)(PO_4)_2$ a été préparé par la méthode hydrothermale. Sa structure cristalline a été résolue dans le système monoclinique I2/m. La substitution d'un atome de magnésium et du proton du groupement HPO_4 par un fer trivalent (Fe^{III}) dans le composé $PbMg_3(HPO_4)(PO_4)_2$ a permis d'isoler cinq nouveaux composés par voie solide. Quatre phosphates de formule $MMg_2Fe(PO_4)_3$ (M = Ba, Sr, Pb, Ca) s'apparentent à deux types structuraux différents. Les composés contenant Sr et Ba sont de type α- CrPO4 et cristallisent dans une maille orthorhombique de groupe d'espace Imma. Quant à ceux contenant Ca ou Pb, leur structure s'affine dans le groupe d'espace P21/n du système monoclinique. Le cinquième phosphate est de formule $Ca_2MgFe_2(PO_4)_4$ cristallisant dans le système monoclinique avec un groupe d'espace Pbca. Enfin, nous avons synthétisé cinq nouveaux phosphates à base de Mg, de Fe et d'élément monovalents : $NaMg_3(HPO_4)_2(PO_4)$, $Na_2Mg_2Fe(PO_4)_3$, $Ag_{1,67}Mg_{2,33}Fe_{0,89}(PO_4)_3$, $Na_{1,85}Mg_{1,85}In_{1,15}(PO_4)_3$ et $Ag_{1,69}Mg_{1,69}In_{1,31}(PO_4)_3$, en utilisant aussi bien la méthode hydrothermale que la synthèse par voie solide. Ces phosphates cristallisent dans le système monoclinique de groupe d'espace C2/c et s'apparentent au type structural alluaudite. La poudre cristalline des phases stoechiométriques $A_2Mg_2Fe(PO_4)_3$ (A = Na, Ag) a été synthétisée par voie solide et caractérisée par la diffraction de rayons X sur poudre. L'étude de la conductivité en fonction de la température de ces deux composés conduit a $\sigma = 0{,}12\times10^{-4}$ $S.cm^{-1}$ pour $Na_2Mg_2Fe(PO_4)_3$ et à $\sigma = 4\times10^{-3}$ S.cm-1 pour $Ag_2Mg_2Fe(PO_4)_3$ à 500°C.

Mots clés : synthèse hydrothermale, synthèse par diffusion à l'état solide, diffraction de rayons X, résolution structurale, conductivité.

Optical and Structural Properties of RF-sputtered ZnS:Ni thin films

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[1]Laboratory of Materials Energies and Environments, Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech 40000, Morocco.
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ABSTRACT — Nicklated zinc sulfide ZnS:Ni thin films were deposited on glass substrates by radio frequency (RF) sputtering using a Zinc Sulfide (ZnS) targeting an (Ar) atmosphere with various percentage of Ni doping varying from 2 to 8%. The RF-power and time of deposition were also fixed at 200 W and 1h, while the Argon pressure was (10^{-2} mbar). The ZnS:Ni films deposited showed a nearly stoichiometric composition with a preferred orientation along the (111) direction of the sphalerite cubic phase as revealed by the X-ray diffraction (XRD) analysis. The UV-visible-NIR measurements showed that the films have less than 60% transmission of visible wavelength (395-695 nm), while the optical band gap decreased slightly from 3.49 to 3.38 eV as the percentage of doping is increased. Scanning electron microscopy observations exposed smooth surfaces type of films. FT-IR data exhibited absorption peaks at wave number of 3730.65 cm^{-1}, which could be attributed to the O-H stretching vibration. Also, 1200 and 565.02 cm^{-1} are assigned to asymmetric and symmetric Zn-S stretching bond.

Low voltage organic transistors using almond gum: A natural, biodegradable and biocompatible polymer dielectric

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Abstract: In this work, we present low voltage organic transistors using almond gum as the gate dielectric. The device has been processed on glass substrates with poly(3,6-di(2-thien-5-yl)-2,5-di(2-octyldodecyl)-pyrrolo[3,4-c]pyrrole-1,4-dione)thieno[3,2-b]thiophene) (DPPTTT) polymethyl methacrylate (PMMA) blend as the active layer and gold as the source and drain electrodes. The transistors operate at low voltage (VGS≤3 V), with threshold voltages of -0.8 V, saturated field effect mobilities above 0.75 $cm^2.V^{-1}.s^{-1}$, subthreshold swings around 270 mV/dec and ON/OFF current ratio equal to 10^3. These features have a high potential to pave a way towards using naturally occurring, biodegradable electronic materials in future low-cost electronics.

Keywords: Almond gum, dielectric, organic transistors

Kinetic adsorption of methylene blue using synthesized polymeric membranes

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Abstract

Polymer science has seen a great development in recent years. Polymer-based materials are applied in many scientific fields and at the nanotechnology. Among the fields to which polymers are applied, we can mention namely: medical, pharmaceutical, nanoparticles, water and wastewater treatment. This work is focused on the removal of methylene blue (MB) from aqueous solution by adsorption on polysulfone (PSf) and polyacrylic acid (PAA) synthetic membranes which were prepared specifically for this purpose. Investigations have covered membrane properties and the determination of adsorption parameters. The immobilization of PAA chains into PSf matrix was revealed by FTIR analysis, whereas the presence of small superficial microcavities was demonstrated by SEM scanning. Otherwise, the increase in PAA fraction (0 to 10%), in membrane composition, induces an increase in swelling ratio (23–47%) and ionic exchange capacity (0.4–0.9 meq/g). Moreover, the equilibrium adsorption capacity improves with theincrease in alkalinity of initial adsorbate solution (pH = 2-11) and with the concentration (C = 5-35 mg/L). The results of kinetic adsorption show that the mechanism of adsorption is perfectly fitted by pseudo-second order (R^2= 0.995) and the isotherm adsorption follow the Langmuir isotherm (R^2= 0.992). From the different applied adsorption models, it was found that the maximum Langmuir adsorption capacity Qm was 227.76 mg/g and the Freundlich index of adsorption n was 1.86.

Keywords: adsorption, methylene blue, dye removal, PAA.

Fabrication of Cu_2SnS_3 thin films by Sol Gel for solar cells

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Abstract:

Copper-Tin-sulfide thin films were fabricated by the sol-gel method on soda lime glass. The structural, morphological and optical properties of these thin films were studied by X-ray diffraction, scanning electron microscopy, and ultraviolet-visible-NIR spectroscopy. X-ray diffraction studies revealed the formation of the cubic Cu_2SnS_3 (CTS) phase for the annealed thin films at 350°C in nitrogen atmosphere. The optical band gap of (CTS) synthesized is 1.28 eV [1, 2].

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