Preface
XIIth Maghreb Days of Material Sciences
JMSM'2015

Overview

The JMSM (the XIIth Maghreb Days of Material Sciences) are organized each two years in a
Maghreb country, the 2015 edition was held between 19-21 November 2015 on the campus of
Faculty of Sciences and Technology Sidi Mohamed Ben Abdellah University of Fez, the
imperial city of Morocco.

The JMSM event was an opened exchange discussion forum, scientific debate and interchange
ideas and knowledge between the Maghreb communities and their national and international
colleagues. The conference focused on materials science, from the synthesis step, processes
development, to industrial use and exploitation, through modeling and observation of the
physicochemical phenomena that govern their functioning. It was also a good opportunity for
researchers to establish cooperation relationship, enhance mutual exchanges, and promote industrial
research and development, which ensure much better socio-economic integration of the university
and strengthening its role as a nucleus of development and pioneer through research and innovation.

The JMSM'2015 program included many topics related to Material Sciences namely:
Nanotechnologies and new-materials generation, Biomedical and Biology, Photonics, Electronics,
Building materials &Heritage, Energy, Environment, Security and Transport.

JMSM'2015 has attracted 250 submissions, after the review process, 155 papers have been
accepted between oral and posters communications and 40 papers were selected for publication.

The conference was well attended by participants from many different organizations including
researchers, PhD students, industrials and academics from different countries.

All our thanks and acknowledgments go to our sponsors who supported JMSM'2015 Fès, and all
those who contributed to the success of this conference. Especially, we would like to acknowledge
ERSI Laboratory members, the organizing and scientific committees for their valuable help, time and
effort in the peer-reviewing and the organization.

Editors
Introduction

Laboratory of Renewable Energies and Intelligent Systems (LERSI)
Organizer lab

Electronics and renewable energies are among the strategic development axis, sustained by the high level authorities of the Morocco kingdom. Both of these fields are substantial deposition of direct and indirect jobs.

The ERSI laboratory is coming to support this work. Our university and our institutions have long initiated the training of young graduates in the fields of electronics microelectronics (Master FST), embedded systems (engineers cursus ENSA) and telecommunications systems (engineers cursus FST and ENSA). With their expertise in these areas and given the recent funded research projects in the field of renewable energy as intelligent systems, three teams from both institution (FST) and (ENSA - National School of Applied Sciences) have decided to pool their efforts and establish a research laboratory specializing in renewable energy and intelligent systems.

This laboratory is formed by three teams:

- Systems of renewable energies and energy efficiency (SEREE): this team is formed by researcher coming from the FST, headed by Prof. MECHAQRANE Abdellah, and has a long history and facilities that allow it to qualify solar and wind fields in the Fez Boulmane region.
- Telecommunication network and software engineering (MSE), this team is formed by the ENSA researcher, headed by Prof. BENNANI DOSSE Saad. This team has a long research experience in the fields of telecommunications, antennas and related items. Also some of involved researchers work on software engineering to develop some tools for internet of things, data processing and mailing.
- The third team is Microelectronic and embedded systems. This team is a mixed, as it involves researcher from the two establishments (FST and ENSA). It is headed by Prof. A. AHAITOUF and works on microelectronics component, integrated analogue and digital circuits design, VLSI design, embedded systems, video processing etc...

Motivation:

Our skills are varied, diverse and complementary. They include electronics, telecommunications, processing of the signal applied mathematics, numerical methods, and hardware programming languages. We chose to combine renewable energy and intelligent systems already at the name of the laboratory for better visibility and to show the consistency that does exist between these two themes and that sometimes goes unnoticed. Indeed any modern system of renewable energy incorporate an electronic system for command, sun tracking and/ or energy management and optimization. The electronic systems are today incorporating advanced software programs, communications systems ranging from classic wire-connected antennas and networks to the more modern, functioning with all types of waves or wireless systems such Wi-Fi, Zig-Bee, Bluetooth ... etc.

Of course their design responds to a drastic set of specifications both in terms of response time (software design) the space occupation (hardware design). These constraints show how the balance between these various skills is desirable for successful smart and futuristic systems. In fact an intelligent system is not only a system controlled by computer, but it integrates some additional elements including temperature, pressure, humidity and radiation sensors, etc ... However, it can be qualified as smart that when it is used to control and manage the multitude of sensors, data and treatments and making the good decision in the convenient time.
Moreover, alongside the renewable energy systems, the development of embedded systems remains a priority for our laboratory, these miniaturized and intelligent systems can make our teams competitive again large international groups in these high technology areas and high added values.

We have initiated innovative training at national level and hope to move forward in the areas research and develop useful intelligent systems in territorial surveillance, biomedical, video surveillance etc...

It is as natural as any design or invention that will be innovative when it fits perfectly into its environment, this is done in most cases by the communication and exchange of information between a command emitter (master) and a command receiver (slave) and this can only be implemented by a true knowledge of standards and standard telecommunications. The huge potential provided by the RTL team of the ENSA of Fez.

Also in this laboratory we will open our field of investigations on all other issues relating to the progress of our specific research and ranging from optimization algorithms, numerical methods through Web Services, the driven engineering models, and design and implementation of intelligent systems enhancing the concept ABC (Always Best connected) for the next generation of connected vehicles.

Given the complementarily of our skills, given the desire of each member and given the developed research at the university, we decided the common creation and accreditation of this laboratory, to enlarge and diversify the offer of our university and to fix us a new challenging project.

**Partnership**

**National Partners**

- Moroccan Foundation for Advanced Science, Innovation and Research (MASCIR)
- National Center for Scientific and Technical Research (CNRST)
- Research Institute for Solar Energy and New Energies (IRESEN)
- International University of Rabat
- Cadi Ayyad University Marrakech
- Faculty of Sciences and Technology Mohammed
- National School of Applied Technology Fez, Morocco (ENSAF)
- ENS Casablanca
- Zodiac Aerospace
- AIC Metallurgie

**International Partners**

- Lorraine University LMOPS Laboratory
- GeorgesTech Lorraine UMI2958GT-CNRS
- Sherbrooke University Canada
- Lille University 1 IEMN
- INSA Lyon
- INSA EuroMed
- ESEO Angers
- ESIEE Paris
- Bordeaux University
- ENIS de Sfax -Tunisia
- Belfort University
- Limoges University
- Sophia Antipolis Nice LEAT Laboratory
- University Beijing, China
- Iasé Faculty, Romania University

Editors
XIIth Maghreb Days of Material Sciences JMSM’2015
Photographs
19-21 November 2015 on the campus of Faculty of Sciences and Technology
Laboratory of Renewable Energies and Intelligent Systems (LERSI)
Sidi Mohamed Ben Abdellah University Fez, Morocco
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F Errahimi (FST -Fès)  N ES-Sbai (FST -Fès)  M Haddad (FS -Meknès)  S Haouache (FST -Fès)
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A Mechaqrane  
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(FST -Fès)

Website and Online submission

Ben Mohammadi Z (FST -Fès)  
Bououd M. (FST -Fès)
Registration and payment

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Sponsoring organisations/funding acknowledgements

Research Institute for Solar Energy and New Energies (IRESEN)

National Center for Scientific and Technical Research (CNRST)

Urban Community of Fez

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Banque Populaire Morocco (BP)

Le Groupement d’Assurance du Supérieur (GASUP)
Organizers

Sidi Mohamed Ben Abdellah University Fez, Morocco (USMBA)

Faculty of Sciences and Technology Fez, Morocco (FSTF)

National School of Applied Sciences Fez, Morocco (ENSAF)

Laboratory of Renewable Energies and Intelligent Systems (LERSI)
Keynote & Invited Speakers (Plenary conference)

Prof. Hassan MAHER  
Sherbrooke University, Canada  
Plenary conference title: Gallium nitride microelectronic components for high power applications

Prof. Abdelkader SOUIFI  
INSA Institut des Nanotechnologies Lyon, France  
Plenary conference title: The advances in nanotechnology for the energy, demographic and diversification challenges of functions on nanoelectronic chips on silicon

Prof. Abdelilah BENYOUSSEF  
MAScIr-AH2ST- Mohammed V University Rabat, Maroc  
Plenary conference title: Design of new materials and functional nanomaterials by the functional theory of density

Prof. Mimoun EL MARSSI  
Université de Picardie Jules Verne, France  
Plenary conference title: The contribution of Raman spectroscopy to the study of ferroelectric oxides
Prof. Ali SOLTANI  
*IEMN Université des Sciences et Technologies de Lille, France*  
Plenary conference title: *Potentials and applications of the GaN. What possible future for GaN on silicon substrate for power applications in microwave and millimeter wave?*

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Prof. Izeddin ZORKANI  
*FSDM, Sidi Mohamed Ben Abdellah University Fez, Maroc*  
Plenary conference title: *Nanomaterials, optical properties and application opportunities for photovoltaics*
# List of Participants

**Title**  
**Participant's name**  

| Title                                                                 | Participant's name               |
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| Mécanismes de transport dans les diodes Schottky réalisées sur GaN  | AMOR Sarrah                      |
| Propriétés diélectriques et magnétiques des Composites CoFeNiBSiMo, CoFeBSiCr et CoMnSiB dans une large bande de fréquence. | MyChrif ELBOUBAKRAOUI            |
| Contribution to the thermal and mechanical behavior of the two materials at the base of clay reinforced by fibers alfa and of straw fibers. | Yassine EL HAMDOUNI              |
| Numerical study of a trapezoidal cavity filled by nanofluids and heated from below. | Abdelmajid EL HASSNAOUI         |
| BehaviouralElectrothermal Model of Silicon and Silicon Carbide Power Devices | Abderrazak LAKRIM               |
| Improvement of Direct Torque Control by using a space vector modulation control of three level inverter | Amina ACHALHI                   |
| Etude de l’influence du dopage sur les nano composites conducteurs à base de Polypyrrole (Cl)/TiO2 | Nacer-Eddine DJELALI            |
| Electron transfer and photoluminescence quenching investigation of Reduced graphene oxide-Meso-tetrakis(4-phenylsulfonica-acid)porphyrin composite | Omar BAJJOU                     |
| Mécanique Statistique des Matériaux Biologiques Confinés            | Radouane EL KINANI              |
| The improvement of mechanical properties of the PbSbAl and PbSbAlSn alloys for energy storage for the new generation. | Kanza MARBOUH                   |
| Study of structural and electronic properties of [NH3-(CH2) n-NH3] ZnCl4, n=8, 10 using DFT. | Rajae EL MRABET                 |
| Etude du confinement des membranes lipidiques de topologie toroïdale et l’influence de l’adhésion au container | Lila BOUZAR                    |
| Synthèse d’une apatite silicatée à partir du carbonate de calcium et de l’acide phosphorique dans un milieu eau-éthanol et son évaluation biologique in vivo | Houda LABJAR                   |
| Thermal stability of a modified sol-gel derved hydroxyapatite nanopods | Smaiel HERRADI                  |
| Etude biologique et anti-bactérienne de bioverres élaborés par voie sol-gel dans les systèmes SiO2-CaO, SiO2-CaO-P2O5 et SiO2-CaO-P2O5-Ag2O | Sarra BOUAHZMA                 |
| Monte Carlo simulation of a spin-3/2 Blume- Capel nanoparticle | Noura ZAIM                     |
| Monte Carlo study of a ferromagnetic nanoparticle system with disordered shell. | Noura ZAIM                     |
Élaboration d’un pigment de structure spinelle par voie sol gel
Youssef EL JABBAR

Etude comparative de quatre algorithme de commande MPPT pour un générateur PV
Sarah ELHIMER

The Effect of ZrO2 and Al2O3 addition on the mechanical and physical properties of HAP.
Mohammed ES-SADDIK

Pressure Drop Analysis of Packed Bed Thermal Energy Storage Systems.
Zineb ERREGUERAGUI

Sliding mode controller for a photovoltaic pumping system.
Sabah MIQOI

The influence of calcium content on the performance of geopolymeric-based materials
Fouzia ALLALI

The contribution of EDXRF, 13C NMR/CP-MAS, XRD and FTIR spectroscopy in art conservation study of Historical Moroccan manuscripts from the 16th, 17th, 18th and 19th centuries exposed to accelerated ageing.
Latifa HAJJI

Structural and Morphological Characterization of Moroccan Wooden Artifacts Dating to 21th, 17th, 12th Centuries Using ATR-FTIR And Raman Spectroscopy, SEM And X-Ray Diffraction.
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Structural Assessment of the Natural Degradation Effects in Works on Wood Based Materials: A Case Using SEM, X-Ray Diffraction, FTIR and Raman Spectroscopy.
Somia FELLAK

Simulation numérique de l'encrassement dans un échangeur de chaleur à plaques lors d’une phase de traitement thermique du lait par un code Fluent en présence d’un milieu poreux
Mahdi YOUCEF

Structure and evolution of the phase space of the Paul trap system
Jaouad KHBACH

Quantum Monte Carlo study of the electric properties of a ferroelectric super lattice
Abdellah FERAOUN

Structural and optical properties of vanadium oxide based nanocomposites
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Influence of dipolar interactions on the super paramagnetic relaxation time of g-Fe2O3
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Conversion treatment of chromiumlayersdeposited on high carbonsteelsubstrates
Younes BENARIOUA

Étude d’électrosorption du Zinc sur charbon préparé à base d’écorces de banane activées chimiquement.
Houda BENAKOUCHE

Conception et réalisation d’un système solaire autonome.
Ahmed GAGA

Une nouvelle approche pour l’adsorption des ions ammoniums des eaux usées.
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Bio-elimination d’un colorant acide (ETL) par des cellules sèches de streptomyces.
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| Mécanisme de dégradation des bâtiments anciens                        | Ibissam KOURDOU                              |
| Caractéristiques spectrométriques de marbres du Maroc                 | Salam Khrissi                                |
| NIEL Calculations for Estimating the Displacement Damage Introduced in GaAs Irradiated with Charged Particles | El Mehdi El ALLAM                            |
| Growth Mechanism, Structural and Optical Properties Hydrothermally Synthesized Vanadium Oxides Nanobelts | IssamDerkaoui                                |
| L’effet d’un champ magnétique aléatoire sur la relaxation super paramagnétique | Abdelkhalek HOUSNI                           |
| Elimination d’un colorant de textile par adsorption sur charbons actifs obtenus à partir de noyaux de jujubes. Etude de l’influence de l’adjuvant. | Mounir DAOUD                                 |
| Study of the corrosive effect of derivatives of 5-bromo-1H-indole-2,3-dione on carbon steel in a 1M hydrochloric acid solution. | Yassine KHARBACH                             |
| Localisation des ondes électromagnétiques dans les cristaux photoniques 2D périodiques et quasi-périodiques | Rihab ASALEMI                                |
| Middle infrared omnidirectional mirror based on deformed one dimensional photonic crystal | Tayssir GAHEF                                |
| The influence of the doping element on the calcinations temperatures, the grain size and the crystal phase the lead titanate. | Lamiae MRHARRAB                              |
| Effect of magnesium substitution on the magnetic properties of Ni-Mg ferrites with compositions Ni1-xMgxFe2O4 | Najib BENZAKOUR                              |
| Physical and optical properties of nanostructured Na and Sb doped CuInS2 thin films produced by Glancing Angle Deposition (GLAD) | CHAFAK AKKARI Férid                       |
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| Influence de la nature ferroélectrique de niobate/tantalate de lithium sur le processus photocatalytique pour la réduction de l’oxygène dans la pile à combustible microbienne (MFCs). | Nour-Eddine TOUACH                             |
| Performances of reverse osmosis and Nano filtration membranes for desalination: characterization and modeling. | Youssef Amine BOUSSOUGA                     |
| L’utilité des filtres polychromatiques a base des cristaux photoniques symétriquement déformée (Bg5/Cu3/Bg5). | Zina BARAKET                                 |
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| Filtres interférentiels poly-chromoteurs à base de cristaux photoniques unidimensionnels construits selon la distribution Cantor généralisée | Osswa SOLTANI                                |

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Mohammed ZOUHAIRI
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Soukaina EL MOUDNY
Brownian Diffusion of Particles on Liquid-Liquid Interfaces of Pickering Emulsions
Soukaina EL MOUDNY
Dirac-Equation for Graphene with an Arbitrary Potential: Exact Analytical Results and General Proof of Bloch's Theorem
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Mohamed SANNAD
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Sara ARMOU
Modélisation par data mining d’un four de galvanization.
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| Quantum chemical investigations study of the Bis-Dipolar Diphenylamino-Endcapped Oligoarylfuorenes: Correlation Structure – Properties and Optoelectronic Applications. | Tayeb ABRAM                      |
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| BIOSORPTION DU COLORANT BLEU BEZEMA SBL EN SOLUTION AQUEUSE PAR L’ALGUE VERTE ULVA LACTUCA | Narimane KHEDDAM                 |
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| Elemental and structural non-invasive analyses of coloring materials in ancient Moroccan manuscripts | Abdelmajid EL BAKKALI            |
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| Synthesis, crystal structure and characterization of 2D-hybrid Cobalt hypophosphite, potential material for catalysis. | ATIPO ITOUA NGOPOH Fernand       |
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| Étude théorique par calculs quantique de quelques propriétés moléculaires de quinoxalin-2 (H)-one, 3-méthyl quinoxalin-2(1H)-one et 3-benzylquinoxalin-2(1H)-one | Rachid JDAA                      |
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| Focal shift in radially polarized Bessel-like beam                   | El Mostafa EL HALBA                                                      |
| Spectroscopic Analysis of Polyfuran and Theoretical Investigation of Electronic Properties of Oligofurans destined for the solar cell applications. | Mustapha ABARKAN                                                        |
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