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1383rd Conference

October 2017 | Volume 5 | Issue 6 | ISSN: 2321-6212

Research & Reviews: Journal of Material Sciences

Proceedings of

## 13th International conference on

# Advanced Materials and Nanotechnology

## October 26-28, 2017

## Osaka, Japan


Conference Series

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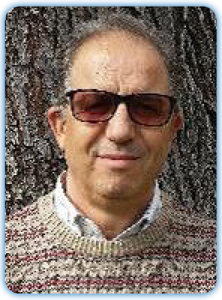
# Keynote Forum

## (Day 1)

Abderrazzak Douhal, J Mat. Sci. 2017, 5:6
DOI: 10.4172/2321-6212-C1-007





*Abderrazzak Douhal*

*Universidad of Castilla-La Mancha, Spain*

## New advances in MOFs photonics and applications

Metal-Organic Frameworks (MOFs), a class of crystalline porous compounds, have emerged as smart materials with a wide range of uses and applications. In this Lecture, I will talk about our results exploring the spectroscopic and photodynamical properties of a series of Zr-based MOFs and their possible uses in nanophotonics, photocatalysis and detection of explosive molecules. We investigated the photoproperties of Zr-NDC MOF, which is made of Zr-clusters and 2, 6-naphthalene dicarboxylate linkers. We have incorporated different dyes into the MOF porous structure and showed the occurrence of energy transfer processes from excited MOF to the trapped dyes. We have also studied the photoproperties of Zr-NDC and a mixed-linker Zr-MOF (Zr-NADC) by using transient absorption techniques. We have established the formation of a charge separated state in both MOFs. Upon excitation, an ultrafast ligand-to-cluster charge transfer process takes place, leading to the formation of the related long-lived charge separated state. I will also show results on efficient light harvesting within C153 at Zr-Based MOF embedded in a polymeric film and the use of two new functionalized mixed-linkers MOFs (Zr-NDC/To1 and Zr-NDC/To2) as fluorescent sensors of nitroaromatic explosive molecules. These results shed new light on the photoproperties of different luminescent MOFs and their possible photonics applications, opening the way for further investigations and giving clues to new developments of smarter MOF materials.

## Biography

Abderrazzak Douhal is a Professor at the University of Castilla-La Mancha, Spain. His research is focused to the study of photoevents in condensed phase, molecular pockets and pores, advanced hybrid materials based on zeolites, mesoporous materials and metal-organic frameworks and perovskites-based solar cells using different techniques of ultrafast spectroscopy and single molecule fluorescence microscopy. He has published more than 160 scientific contributions and served as a Member of the Editorial-Boards of *Chem. Phys. Lett, J. Photochem, Photobiol. A. Chem.*, and *Inter. J. Photo-energy*. He is a Member of RSEQ, GRUFO, EPA, IUPAC, IAAM and AAAS.

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Soon Hyung Hong, J Mat. Sci. 2017, 5:6
DOI: 10.4172/2321-6212-C1-007



*Soon Hyung Hong*

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## Fabrication and applications of carbon nanomaterials filled multi-functional nanocomposites

Carbon nanomaterials, such as Carbon Nanotube (CNT) and graphene, are promising fillers for nanocomposite materials due to their excellent mechanical and functional properties. Previous researches on carbon nanomaterials filled nanocomposites have shown limited enhancement of properties due to strong agglomeration of the carbon nano-materials and poor interfacial bonding between the carbon nanomaterials and matrices. In this presentation, a novel fabrication process, named as molecular-level mixing process, is introduced to fabricate carbon nanomaterials filled nanocomposites in order to maximize the effect of filler addition in various matrices. The molecular level mixing process has been proved to realize homogeneous dispersion of nanomaterials with strong interfacial bonding with matrices. Various types of carbon nanomaterials filled nanocomposites with remarkably enhanced mechanical, electrical and electro-chemical properties show a wide scope of possible applications such as strong and tough structural materials, EMI shielding materials, flexible and stretchable conductors, electrodes for energy storage devices and organic photovoltaic cells, etc.

### Biography

Soon Hyung Hong has completed his PhD in department of materials science and engineering at Northwestern University. After having R&D experience at Stanford University as a Research Associate, he joined Korea Advanced Institute of Science and Technology (KAIST) as a Professor, Directing Research and education on nanomaterials and nanocomposites. He pioneered to develop frontier technologies for fabrication processes and applications of multi-functional nanocomposites and served as the President of the Korea Society for Composite Materials (KSCM) and the Director for Basic Science and Engineering at National Research Foundation (NRF). He has published 242 international journal papers and registered 146 patents mainly in areas of nanomaterials and nanocomposites.

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## (Day 2)

Kenneth Reifsnider, J Mat. Sci. 2017, 5:6
DOI: 10.4172/2321-6212-C1-007



**Kenneth Reifsnider**

*University of Texas, USA*

## Dielectric nanomethods for assessment of composite material integrity and properties

Composite materials are essential for many modern applications, including airplanes and cars, energy conversion and storage devices, medical prosthetics and civil structures. The properties and long-term performance of such materials are determined by the integrity of internal material interfaces at the nanolevel and under mechanical loading by a complex sequence of progressive nucleation, accumulation and coalescence of micro-damage that is always related to the micro-morphology of the constituents and their properties. Although detecting and modeling all the discrete details at the local level is quite difficult and in some cases not feasible, it would be very useful to identify observable local parameters that directly reflect the global properties and integrity of such materials and specially to detect and predict the onset of different stages of damage development so that remaining strength and life could be estimated. The present paper reports the discovery of such a method and the construction of fundamental local concepts and relationships that define the global properties and performance of composite materials and methods of interpretation that define the boundary between the distributed nucleation of defects and the interaction and joining of individual defects to create micro-cracks and eventually unstable fracture planes. The new concepts are based on the application, understanding/modeling and interpretation of the dielectric response of such materials to low-frequency, low voltage input fields which results in very clear indications of changes in the global dielectric constants of a fibrous composite material. Conceptual, computational and physical foundations for the new concepts are discussed. Applications of the concepts are suggested in diverse situations, from structural mechanics to fuel cells to the durability of nuclear waste forms.

### Biography

Kenneth Reifsnider is a graduate from Johns Hopkins University in the general field of materials and has served on the faculties of Virginia Tech, University of Connecticut, University of South Carolina and the University of Texas. He is the Director of the Institute of Predictive Performance Methodologies at UT Arlington and a Member of the National Academy of Engineering in the US. He has more than 300 archival publications and has given invited guest lectures in more than 20 countries.

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S Packirisamy, J Mat. Sci. 2017, 5:6
DOI: 10.4172/2321-6212-C1-007



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## Polymer-derived ceramics for space applications

Inorganic and organometallic polymers capable of giving ceramics in good yield (at least 50%) when subjected to pyrolysis are referred to as preceramic polymers. There are several advantages in using preceramic polymers for obtaining ceramics. Using conventional ceramic processing techniques, it is difficult to get non-oxide ceramic coatings, continuous ceramic fibers and ceramic films. Preceramic polymers can be processed using conventional polymer processing techniques into coatings, films, fibers and composites followed by pyrolysis and sintering to get ceramic coatings, ceramic films, ceramic fibers and Ceramic Matrix Composites (CMCs). Unlike the conventional ceramic processing routes, preceramic route invariably gives nanoceramics and hence, it is easy to machine polymer-derived ceramic components. Yet another advantage is that conversion of polymers to ceramics takes place at relatively low temperatures (1200-1500 °C) when compared to conventional processes (~2000 °C). Keeping in view of the potential space applications, the research work on polymer-derived ceramics was initiated in the Space Centre in 1987 and over the years, different types of preceramic polymers such as polycarbosilanes, polysial hydrocarbons, polyborosiloxanes and poly (metalloborosiloxane) have been synthesized and their conversion to ceramics have been studied. These precursors have been evaluated for the following space applications: (1) Oxidation resistant coatings for C/C composites for reentry and reusable launch vehicles, (2) matrix resins for Ceramic Matrix Composites and lightweight ceramics, candidate materials for advanced thermos-structural/thermal protection materials for reusable launch vehicles, (3) thermal barrier coatings, (4) ceramic adhesives and (5) atomic oxygen resistant coatings for low earth orbit space structures.

### Biography

S Packirisamy has obtained his PhD from Indian Institute of Technology Kharagpur, India. He initiated the work on polymer-derived ceramics in the Vikram Sarabhai Space Centre, Indian Space Research Organization and continued to contribute in this area until his superannuation as Deputy Director. He was UNESCO Fellow, Tokyo Institute of Technology, Tokyo, Research Associate, Case Western Reserve University, Cleveland and Visiting Scientist, Michigan Molecular Institute, Midland. Presently, he is a Professor of Chemistry at Sharda University, India. He has 14 patents, 45 publications in international journals and 4 book chapters to his credit.

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