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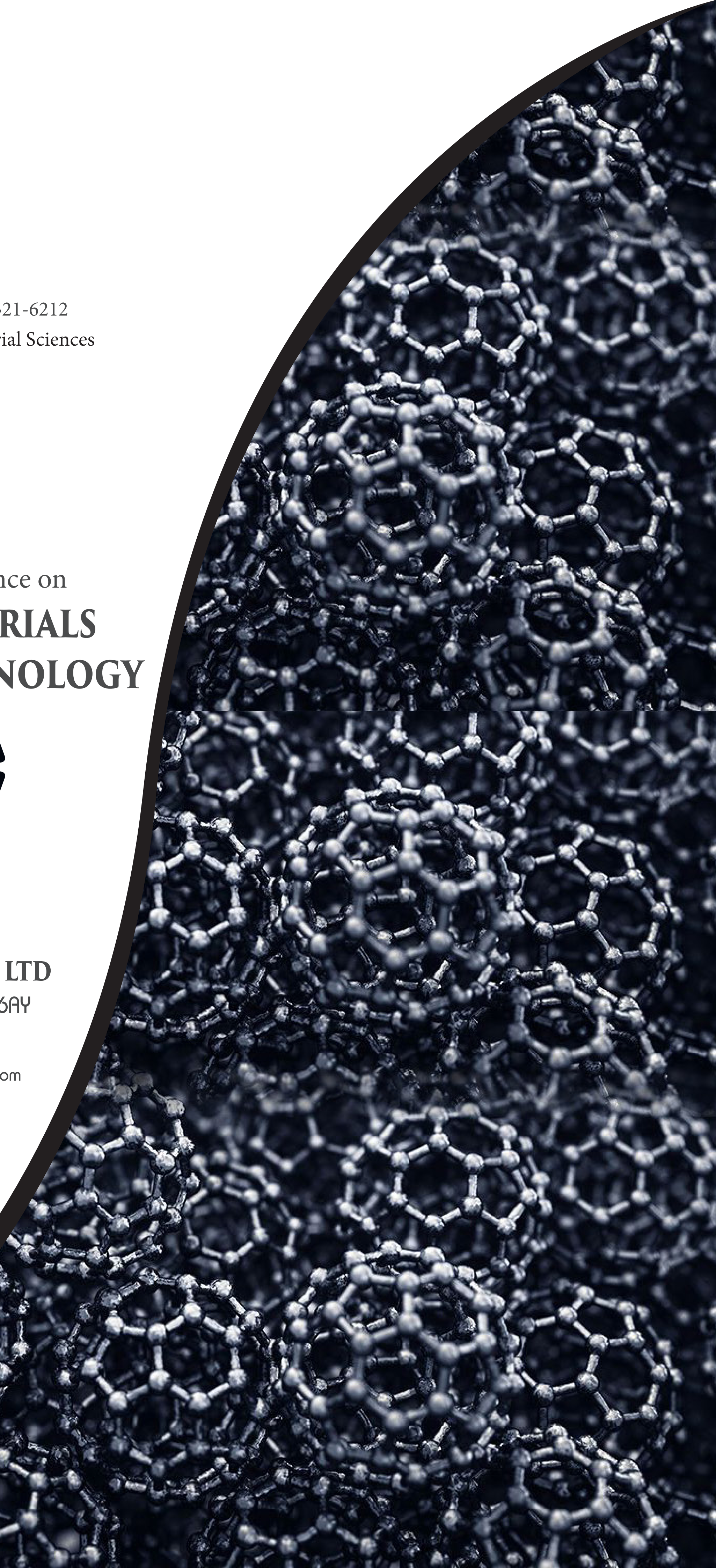
22nd International Conference on

ADVANCED MATERIALS AND NANOTECHNOLOGY

September 19-21, 2018

Tokyo, Japan



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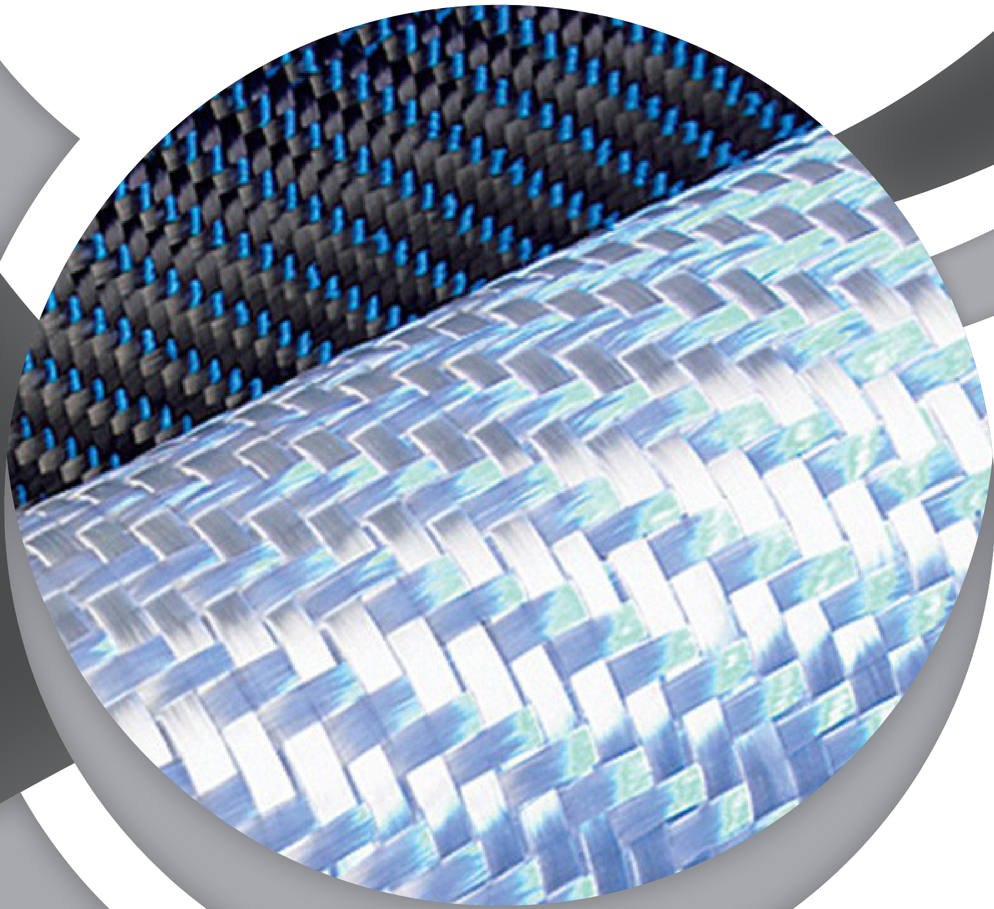

22nd International Conference on

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Keynote Forum

Day 1

Takehito Kato, Res. Rev. J Mat. Sci. 2018, Volume 6
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Takehito Kato

National Institute of Technology, Oyama College, Japan

Morphology control for nano phase separation structures and application to electronic devices

Recent years have witnessed extensive research for the development of electronic devices such as solar cells, thermal electrical conversion devices and light-emitting devices comprising organic and organic-inorganic hybrid materials. For these applications, research targets are efficiency, stability and function. Hence, morphology control has emerged as an important research topic. The effect of the morphology control of nanophase separation structures in the photoactive layer of organic thin-film solar cells and organic-inorganic hybrid thin-film solar cells, from the viewpoint of nanotechnology. Photovoltaic cells, which expected are to serve as a clean and renewable energy source, are among the most abundant technologies for harnessing energy on earth, besides hydropower and wind power. Particularly, organic and organic-inorganic hybrid solar cells exhibit potential advantages like low manufacturing cost, low weight and mechanical flexibility. These solar cells typically contain two electrodes and one photoactive layer. The photoactive layer is composed of bulk heterostructures of a p-type semiconducting material as the electron donor and an n-type semiconducting material as the electron acceptor. The typical thickness of a photoactive layer is of the order of a few hundred nanometers. Irrespective of the thickness of the film, the photoactive layer performs several functions such as light absorption, exciton generation and diffusion, charge separation and transportation. The exciton diffusion length for charge separation is approximately 10 nm, which is very short. Therefore, the size of the electron donor phase in the bulk heterostructure of the photoactive layer controlled should be around 10 nm. Furthermore, after charge separation, the charge carriers have to move to both electrodes. Hence, the phases of the electron donor as well as acceptor should be continuous in each electrode. In this viewpoint, our research group reported on the effectiveness of molecule bulkiness and the solubility parameter of materials used for the morphology control of nano phase separation structures. The nanotechnology of morphology control will immensely aid in the development of novel electronic devices and functional materials in various fields.

Biography

Takehito Kato is an Associate Professor of Mechanical Engineering at Oyama College, National Institute of Technology, Japan. He has completed his PhD from the Kyushu Institute of Technology, Japan. He has worked as a Researcher at Sumitomo Chemical Co., Ltd. from 2007 to 2012. His current research focuses are on the morphology control of organic-inorganic hybrid phase structures and energy conversion devices based on organic-inorganic hybrid materials. His research group works on medical photo sensors, photovoltaic cells and thermal electrical conversion devices. He has published several international peer-reviewed journals and attended more than 100 national and international conferences. He has also published over 60 patent applications.

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Zakaria Abdallah, Res. Rev. J Mat. Sci. 2018, Volume 6
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Zakaria Abdallah

Swansea University, UK

Advancement in materials engineering at Swansea University: A journey into the future

Materials engineering is considered one of the largest areas that is significantly expanding around the globe. This discipline has seen an extensive development at Swansea University over the past years investigating materials for various engineering applications. Titanium, titanium aluminides, nickel super-alloys alongside steel alloys for aeroengine applications are amongst those which have extensively been investigated. These high temperature materials which have typically been developed for the Rolls-Royce gas turbine aeroengines proved to be strong enough to withstand the severe environments in the gas turbine. The work is still ongoing at Swansea University to take these alloys into a higher level and promote their success. The various works that has been carried out over the years in bringing that into reality as well as the potential future projects that will take place at the materials research center at Swansea. Moreover, the current work on developing the Rolls-Royce most efficient aeroengine, i.e. the Ultrafan®. The newly developed UltraFan® changes the whole engine architecture to allow the fan and the turbine to be independently optimized by the introduction of a power gearbox capable of operating at anything up to 100,000 HP.

Biography

Zakaria Abdallah is the Principal and Lead Research Officer of Fatigue and Fracture in the Steel and Metals Institute at Swansea University, UK. He has worked at the Rolls-Royce University Technology Centre at Swansea University and as Consultant for many industries, e.g. Airbus, TIMET, ETD, Rolls-Royce, in UK within Swansea Materials Research and Testing (SMaRT) Ltd. His research interests are in steel and metals, composite materials, materials characterization, creep and fatigue, life predictions of materials, thermo-mechanical testing and heat treatment optimization.

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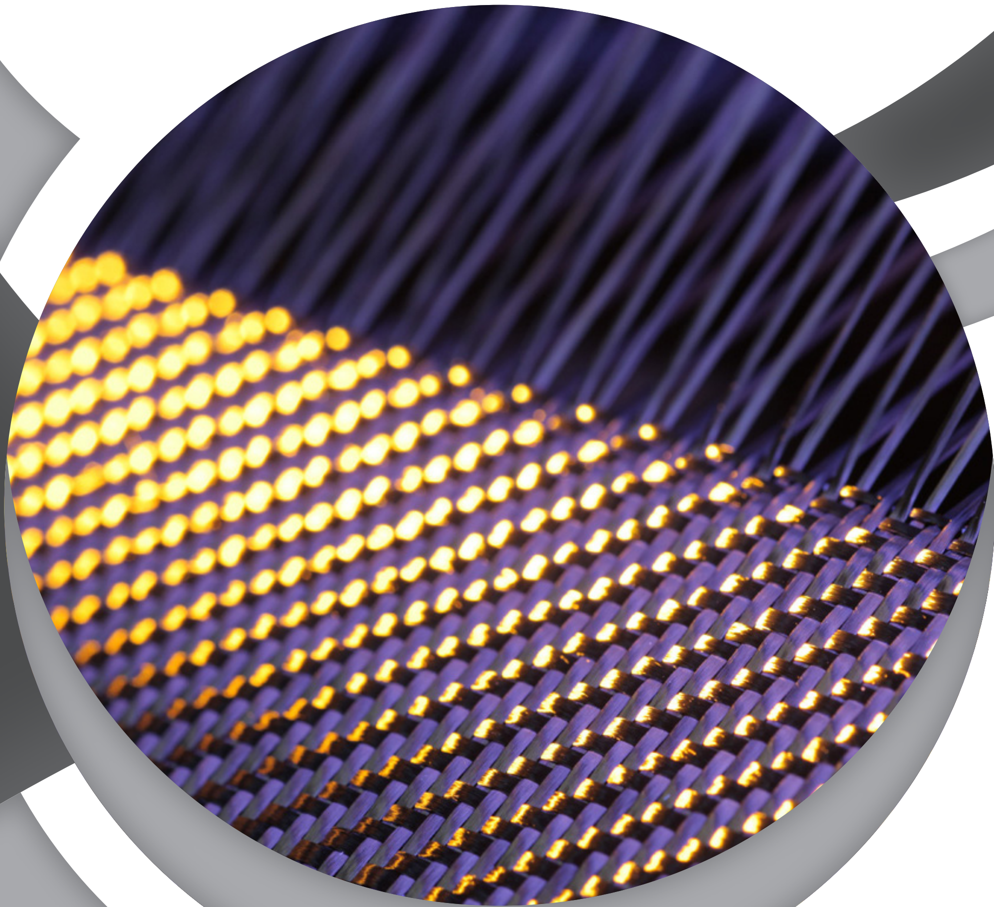

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Day 2

Mohammad S Islam, Res. Rev. J Mat. Sci. 2018, Volume 6
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Mohammad S Islam
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Nanomaterials in polymer composites for applications from aerospace and corrosion protection to energy storage

Nanomaterials used in fiber-polymer composites lead to a marked improvement in performance of the materials used in various applications, including aerospace, corrosion protection and energy storage. Nanomaterials (e.g. carbon nanotubes) grafted on fibers show increased interfacial adhesion to polymer matrix when compared to non-grafted fibers, thus providing increased strength and toughness to the composites. The characterization of pulling out behavior of nanomaterials and the corresponding failure mechanism is significant for the design of high-performance hierarchical nanocomposites for aerospace applications. Microcracks in carbon fiber composite materials can severely degrade the mechanical strength and gas permeability of composites, posing a significant challenge to the use of fiber composites in liquid fuel tanks of launch vehicles. Nanomaterials (e.g. nanosilica) can be used to enhance the fracture toughness and reduce the coefficient of thermal expansion of the polymer matrix in the composites used in liquid fuel tanks. Damage to gas and liquid transport pipelines (excluding water and sewerage pipes) caused by corrosion was estimated to cause costs in excess of 7 billion dollars a year for the United States of America. Against this backdrop corrosion protection and in particular rehabilitation of corroded pipelines is of great importance. Nanomaterials (e.g. nanoclay) based glass fiber reinforced composite overwraps are used to repair corroded pipelines with a short amount of time and without disruption of the fluid transmission in the piping system. Finally, the electrochemical performance of flexible energy storage devices depends largely on the active materials and electrode structures. Nanomaterials (e.g. metal oxide) and their composites with or without flexible textile fibers have been studied as electrodes for supercapacitors and lithium ion batteries with favorable properties.

Biography

Mohammad S Islam has completed his PhD from the University of Waikato, New Zealand. He is currently a Research Fellow in the School of Mechanical and Manufacturing Engineering, University of New South Wales, Australia. He has worked as a Research Fellow at the University of Sydney in Australia, the University of Minho in Portugal, CSIRO Materials Science and Engineering in Australia and Materials Scientist position in Pultron Composites, New Zealand. He has published more than 25 papers in journals and has been serving as an Editorial Board Member of *Composite Materials* of Science Publishing Group.

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