

# Nanotechnology Congress & Expo

August 11-13, 2015 Frankfurt, Germany



**S J Antony**

University of Leeds, UK

## New understandings on the physical and mechanical properties of materials using computational and experimental nanotechnology

Most of the engineering applications involve using materials in discrete and continuum form. For example, particulate materials such as powders and grains are discrete in nature whereas natural rock and concrete samples, though comprised of strongly bonded grains, is often treated as a continuum material. Discrete and continuum materials are extensively used in a wide range of industries, for example in the geotechnical, chemical, mechanical, nuclear, food processing and pharmaceutical engineering applications. Industrial manufacturing processed demand for better understandings on how material properties at nano and micro scales could be tuned to attain desirable macroscopic and functional properties. This requires using multi-scale approaches in studying the functional behaviour of discrete and continuum materials under different loading environments. In this workshop, we present our recent research findings on how physical and mechanical properties originate at small scales using advanced computational methods including molecular dynamics simulations and discrete element method, and a range of experimental methods including photo-stress analysis tomography. We show on how such predictions could help to understand the transport properties, stress transmission properties and bulk strength characteristics of discrete and continuum materials in engineering applications, for example designing concrete structures using Qatar municipal wastes. The results could help to gain a deeper level of understanding on the structure-property relations of discrete and continuum materials across length scales. The studies emphasise the advantages of employing multi-scale approaches and nanotechnology in unravelling the complexities of materials under realistic process and environmental loading conditions.

### Biography

S J Antony is an Associate Professor at the Institute of Particle Science and Engineering, School of Chemical and Process Engineering, University of Leeds, UK. He started his research career as an experimentalist in the area of photonic stress analysis and strength measurement of continuum bodies. However, over the past twenty years, his research focus is on the nano and micro mechanical modelling of particles and their assemblies with particular emphasis on developing structure-property relations. He has published over 100 papers in several reputed international journals and conference proceedings. He actively participates in the activities of particle technology community in UK and abroad. He holds membership in several international professional bodies and serves in technical committees in his area of research. Currently, he serves as a member of peer reviewers in his area of research for several international journals. He is the lead editor of the book on *Advances in Granular Materials: Fundamentals and Applications*, published by the Royal Society of Chemistry, London (2004). He has won many awards, including the prestigious M.I.T Young Research Fellowship for Exemplary Research in Computational Mechanics and the Certificate of Merit as an Example of Outstanding Achievements in UK Particle Science and Technology in 2002, PTSG, IChemE, U.K. He has served as a guest editor for the *Jl. Granular Matter*. Presently, he serves as an Editorial Board Member of the journal of *Research Letters in Nanotechnology* and editorial review board member of Scientific Journals International. His research sponsors include EPSRC, Royal Society, DTI, ICI, BNFL, P&G, Pfizer, Borax Hosakawa Micron, Bridon International Ltd, Merck Sharp & Dohme and DuPont (U.K).

[S.J.Antony@leeds.ac.uk](mailto:S.J.Antony@leeds.ac.uk)