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Nanotechnology and the living city

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The concept of how nanotechnology enabled innovations and nanomaterials can contribute in creating what could be considered a 'living city' will be discussed.

The inspiration behind a number of commercial nanotechnology based products has been natures own innovations and so the idea of considering the built environment as a natural landscape and buildings as being created by nature, even as living beings, would also seem to be a natural evolutionary concept. This introductory presentation discusses how nanotechnologies and the enhanced functionality that can result from developing at the nanoscale can be inspired by nature and how combining different innovations could result in built landscapes that are capable of reacting to their environment in the same way as living organisms.

Nanotechnology may be a small-scale science but the applications for the developments in this area are broad with potential throughout the built environment, for example, energy harvesting, pollution control, advanced construction materials, water capture and reuse. For this presentation the main focus will be on the external surfaces found in the built environment, more specifically on advanced coating technologies and the use of titanium dioxide, as well as touching on new advanced thermal regulating technologies such as aerogel insulation and phase change materials. Consideration will also be given to how these new nanotechnologies can be combined to further reduce the impact of cities with the goal of improving the built environment for future generations.

Biography

Toby Gill has spent over 9 years supporting the UK micro and nanotechnology community. During this time he has been responsible for the organisation of various conferences, trade missions and workshops, has represented the UK at international tradeshows, has presented on various topics relating to nanotechnology applications and has managed the creation of an online network for UK groups working with nanotechnologies. In his personal time he has also established one of the world's largest international online communities for professionals interested in developments at the nanoscale. Prior to this, he was responsible for organising a tour of the UK of a mobile exhibition, demonstrating the use of composite materials to the public and raising awareness of the potential of advanced materials. He has previous academic experience of emerging technologies with a research background in the area of rapid manufacturing, with specific focus on the laser processing of micro powders, obtaining a Ph.D. in 2002 for research into the selective laser sintering of ceramic-polymer composites. His other academic experience includes being awarded a Bachelor's in Materials Science and Metallurgy and obtaining an M.Sc. in Advanced Manufacturing with Lasers.

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Unrevealing (un) folding pathways of the human immunodeficiency virus type 1 protease (HIV1-PR) at single molecule level using optical tweezers

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Understanding protein folding and unfolding of the human immunodeficiency virus type 1 protease (HIV1-PR) at single molecule level is a challenging mission for both experiments and molecular dynamic (MD) simulations. In the present study, we proposed a novel folding mechanisms using optical tweezers (OT) and MD simulations. Our results confirm that the HIV1-PR reveal multiple pathways through different intermediate on their journey to native state. These include HIV1-PR unfold and refold at high forces. The characterized pathways provide precious information for the design of novel and effective anti-HIV drug.

Biography

I. Valpapuram is working as a postdoc at King Abdulla University of Science and Technology (KAUST), KSA. Project: "Optical tweezers studies of DNA unzipping and replication at single molecule level" June 2013. He did his postdoc at University of Modena and Reggio Emilia, Italy; Project: "Energy landscape and inhibition of the folding process of the HIV-1 protease through single molecule manipulation using optical tweezers" 2012-2013. He did his Ph.D. in Physical Sciences at University of Modena and Reggio Emilia, Italy; Thesis: "Single molecule optical tweezers studies of the unfolding/refolding processes of Acyl-Coenzyme A Binding Protein"2009-2012. He did his Advance Masters in Nanophysics at the University of Antwerp, Belgium, Thesis: "Time resolved photoluminescence investigation of charge transfer in organic solar cell materials with novel conjugated polymers"2008.

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