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POLITECNICO DI MILANO

Giovedi 8 September, 2016

Aula Zaffiro Ore 11.30

Nanostructures:

synthesis, properties, applications, and prospects.

Part 1: carbon nanotubes and nanofibers.

The synthesis of one-dimensional carbon nanostructures such as carbon nanotubes (CNTs) and carbon nanofibers (CNFs) from catalyst on substrate using chemical vapor deposition (CVD) has massively progressed in the past decade. We are now able to control the nature of these nanostructures on many length scales and in specific aspects of their composition and morphology. Their pristine exceptional mechanical, thermal, and electrical properties, coupled with the possibility of chemical functionalization to alter their bulk or surface properties (e.g., superhydrophobicity), make them a candidate of choice for a wide array of applications, such as additives or scaffolds for battery and supercapacitor electrodes, reinforcing elements of electrically-conductive polymer composites, sensors, future electronics, etc.

The focus of this first talk (in a two-part series) is to present and discuss the complex scientific aspects of the synthesis of one-dimensional carbon nanostructures, namely the roles of catalyst, underlayers, reservoirs, and gases using CVD. Along with the scientific discussions, I will show many different structures such as mm-tall, dense carpets of crystalline and vertically aligned CNTs on insulating and metallic substrates, self-delaminating and superhydrophobic 3D mats of CNFs, etc. I will present current applicative projects from collaborations that include the nanostructures presented and possible future applications. This talk will deal with some fundamentals that will be useful for the follow-up talk dealing with two-dimensional nanostructures later this year.

The laboratory of Dr. Gilbert Daniel Nessim at Bar Ilan University (Israel) focuses on the synthesis of nanostructures using state-of-the-art chemical vapor deposition equipment. The scientific focus is to better understand the complex growth mechanisms of these nanostructures, to possibly functionalize them to tune their properties, and to integrate them into innovative devices.

The main goal of my talk is to strike new collaborations with researchers at the Politecnico di Milano, my alma mater, in order to invent together innovative materials, systems, and devices.

Dr. Nessim joined the faculty of chemistry at Bar Ilan University in 2010 as lecturer and was promoted senior lecturer with tenure in 2014. He holds a Ph.D in Materials Science and Engineering from the Massachusetts Institute of Technology (MIT), an MBA from INSEAD (France), and Masters in Electrical Engineering from the Politecnico di Milano and from the Ecole Centrale Paris (ECP, within the Erasmus/TIME program). Prior to his Ph.D, Dr. Nessim spent a decade in the high-tech industry and consulting across Europe, USA, and Israel.

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