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Engineered Functional Nanomaterials: Synthesis, Characterization and Applications

Thursday, March 26
105 Behrakis
11:15am – 12:30pm

Refreshments will be served

ABSTRACT The recent advances in nanoscience and nanotechnology have triggered a plethora of functional nanomaterials with controlled morphology and well-defined properties, geared towards a number of applications. Among them, rosette nanotubes (RNTs) and cellulose nanocrystals (CNCs) are two distinct, yet fascinating biocompatible nanomaterials. RNTs are generated from the self-assembly of a bio-inspired building block, featuring the hydrogen bonding arrays of guanine and cytosine. In water, these building blocks can self-organize to form nanotubes, which can grow up to several micrometers in length. Using organic synthesis as a smart engineering tool, the dimensions and properties of these nanotubes can be tuned by modifying the building block or the functional groups expressed on the periphery of the nanotubes. On the other hand, CNCs, a nanomaterial formed from the acid hydrolysis of the most abundant biopolymer on Earth - cellulose, continues to gain increasing attention in the materials community as sustainable nanoparticles with unique chemical, physical and mechanical properties. Their nanoscale dimensions, biocompatibility, biodegradability, large surface area and low toxicity make them promising materials for various applications. This seminar focuses on the chemical modification of these nanomaterials, characterization of the resulting derivatives using spectroscopy and microscopy and their unique properties. Biomedical applications of some of these nanomaterials as potential implant coatings and nanocarriers for cellular delivery will also be discussed.

BIOGRAPHY Dr Hemraz obtained her B.Sc. (Hons) in Chemistry with first class honors in 2003 from the University of Mauritius, Mauritius. She moved to Canada in 2004 to pursue her Ph.D. in Chemistry at the University of Alberta and the National Institute of Nanotechnology of Canada, where she worked on the supramolecular synthesis and self-assembly of functional nanomaterials for bio-applications. She then undertook a post-doctoral appointment at the Civil and Environmental Engineering department at the University of Alberta, where she worked mainly on surface modifications of cellulose nanocrystals for “smart” materials design. Currently, she is appointed as a Research Council Officer/Principal Investigator at the National Research Council of Canada, where she leads a team of scientists on an interdisciplinary research project related to the improvement of crop yield in Canada using tools available in nanotechnology. So far, in her early career, she has 1 patent, 1 encyclopedia chapter, 1 book chapter, 17 peer-reviewed publications, over 40 national and international conference presentations. The diverse research experiences Dr Hemraz had, makes her competent in several areas, including Nanochemistry, Organic synthesis, Materials Chemistry and Biomaterials.

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