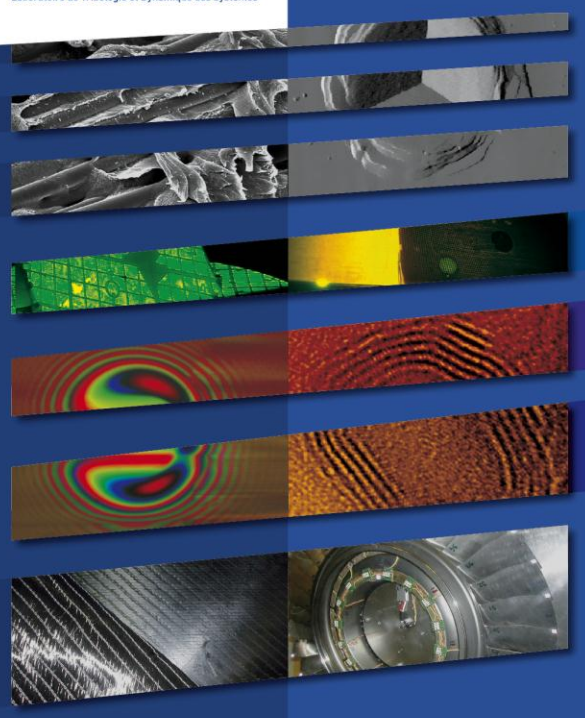

Café scientifique invité

Salle de cours B11 – Bât H10 – 13h

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Inorganic nanotubes and fullerene-like nanoparticles: an update

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This presentation is aimed at underlying the principles, synthesis, characterization and applications of inorganic nanotubes (INT) and fullerne-like (IF) nanoparticles (NP) from 2-D layered compounds. While the high temperature synthesis and study of IF materials and INT from layered metal dichalcogenides, like WS_2 and MoS_2 remain a major challenge, progress with the synthesis of IF and INT structures from various other compounds has been realized, as well. Intercalation and doping of these nanostructures, which lends itself to interesting electronic properties, has been realized, too. Recently, new core-shell nanotubular structures, like PbI_2@WS_2 nanotubes, and INT-SnS_2 have been reported. Re doping of the IF and INT endow them with interesting electrical and other physio-chemical properties. Major progress has been achieved in elucidating the structure of INT and IF using advanced microscopy techniques, like aberration corrected TEM with 0.08 nm resolution and electron tomography. Also recently, scaling up efforts in collaboration with "NanoMaterials" resulted in multikilogram production of (almost) pure multiwall WS_2 nanotubes phases. Extensive experimental and theoretical analysis of the mechanical properties of individual INT and more recently IF NP was performed casting light on their behavior in the macroscopic world.

IF-MS_2 (M=W,Mo, etc) were shown to be superior solid lubricants in the variety of forms, including an additive to various lubricating fluids/greases and for various self-lubricating coating. Following scaling-up efforts, full commercialization of products based on this technology have taken place in the automotive, aerospace, food, machining and other industries. New potential applications have been realized, e.g. in the field of medical technology, by forming self-lubricating coatings which incorporate the IF nanoparticles. Some new potential applications for these and related materials will be discussed in the fields high toughness nanocomposites and (photo)catalysis.

Keywords: inorganic nanotubes; inorganic fullerenes

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