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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 fullerene-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. For example SnS_2 and SnS_2/SnS nanotubes have been synthesized and their detailed structure was recently analyzed. Some control over the electrical properties of IF/INT of WS_2 and MoS_2 was achieved by doping with Re atoms. New core-shell nanotubular structures, like PbI_2@WS_2 nanotubes have been recently reported. Scaling-up efforts in collaboration with "NanoMaterials" resulted in multikilogram production of (almost) pure multiwall WS_2 nanotube phases.

IF-MS_2 (M=W,Mo, etc) were shown to be superior solid lubricants in variety of forms, including an additive to various lubricating fluids/greases and for various self-lubricating coatings. Following scaling-up efforts, initial 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. Major progress has been recently reported with polymer nanocomposites reinforced with both carbon nanotubes and IF-WS_2 nanoparticles.

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