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Short Bio

Prof. Yuval Golan is a professor and Eric Samson Chair of Advanced Materials and Processing at the Department Materials Engineering at Ben Gurion University of the Negev (BGU). He earned his PhD from the Weizmann Institute in 1996 and was a Fulbright postgraduate researcher at the Materials Research Laboratory, UC Santa Barbara until fall 1999, when he joined the faculty of BGU. In 2010 he was promoted to full professor in the Department of Materials Engineering and appointed Director of the Ilse Katz Institute for Nanoscale Science and Technology at BGU. Golan is an active researcher in the area of nanomaterials and thin films, has published over 170 peer-reviewed publications in top notch journals, and supervised well over 50 research students and postdocs. Since 2016, Dr Golan has been serving as Chair of the Synchrotron Committee of the Israeli Academy of Science. In 2020 he was appointed Deputy Vice President and Dean for Research & Development at BGU.

Nanomaterials @ Interfaces: Chemical Routes for Size, Shape and Phase Controlled Nanomaterials

Abstract

Chemical routes for synthesis of semiconductor nanostructures and thin films are straightforward, cost-effective and can often result in high quality nanomaterials with precise size and shape control. Two methods will be presented, both in which interfacial processes play a major role. The first part will present the synthesis of highly uniform nanoparticles capped with surfactants, focusing on the role of 'beneficial impurities' for controlling their shape and phase. Small amounts of charged surfactants were shown to strongly affect alkylamine-based synthesis of anisotropic colloidal ZnS nanoparticles. Furthermore, in 2015 we discovered a new cubic semiconducting binary phase (denoted as the π-phase) in the form of colloidal nanoparticles. The first π-phase material to be discovered was tin mono-sulfide, π-SnS, followed by discovery of cubic tin mono-selenide, π-SnSe. Experimental and computational studies point out that various 'beneficial impurities' can play a major role in reproducibly achieving phase control in the tin mono-chalcogenide system. The second part will highlight chemical solution deposition, offering a simple and versatile route for producing high quality semiconductor thin films directly onto single crystal substrates without the use of organic ligand molecules. A wide range of microstructures is obtained, from nanocrystalline films to 'chemical epitaxy' - monocrystalline thin films with a well-defined orientation with respect to the substrate. This part will highlight the chemical solution deposition pathway to chemical epitaxy, providing examples for well-defined orientation relationship between film and substrate in a variety of systems including new binary phases of tin monochalcogenides.