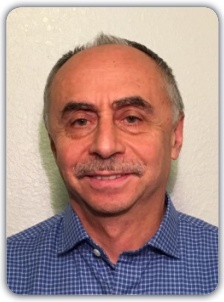
Mikhail E Itkis, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C6-106



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Single-walled carbon nanotube thin films optoelectronics

Single-walled carbon nanotubes (SWNTs) are unique one-dimensional nanostructured materials with outstanding optoelectronic properties which can form two-dimensional possessing either metallic (MT) or semiconducting (SC) properties depending upon the SWNT chirality. MT-SWNTs thin films can be utilized as transparent conducting coating for large area touch screen displays, while the SC-SWNTs thin films can serve as active elements in logic circuits, photodetectors, solar cells and light emitting diodes. In this talk, a development of SWNT thin film applications in electrochromic cells and in UV and infrared photodetection will be discussed. Recently, we proposed a thin film of SC-SWNTs as a new electrochromic media and fabricated a nanotube thin film based electrochromic cell in which the active electrochromic layer is made up of the film SC-SWNTs and the counter-electrode is composed of the film of MT-SWNTs. With an ionic liquid utilized as an electrolyte, more than 100-fold increase of the operation speed (response time in millisecond range) was achieved as compared to traditional electrolyte based systems. In another development, SC-SWNT thin film and wide band gap semiconductor were combined to manufacture a vertical heterojunction ultraviolet (UV) photodetector with SWNT film serving two functions at once: As a large area transparent conducting coat passing the UV light and collecting the photocurrent and as a semiconducting layer forming heterojunction with wide band gap semiconductor ZnO. Thus, multifunctionality of SWNT thin films allows them to become a platform for the development of a variety of optoelectronic applications.

Biography

Mikhail E Itkis is an Adjunct Professor in the College of Engineering and a Researcher in the Department of Chemistry and Center for Nanoscale Science & Engineering, University of California, USA. He is an author on more than 150 peer-reviewed publications, mostly in nanotechnology field with number of citations exceeding 13,000 and h-index of 55. In 2011, he was recognized by Thomson Reuters as a World Top 100 Chemist of the past decade. He had earned a BS and MS from the Moscow Institute of Physics and Technology and PhD in Physics from the Institute of Radio Engineering & Electronics, Moscow, Russia.

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