



ΑΡΙΣΤΟΤΕΛΕΙΟ
ΠΑΝΕΠΙΣΤΗΜΙΟ
ΘΕΣΣΑΛΟΝΙΚΗΣ

ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑ ΦΥΣΙΚΗΣ

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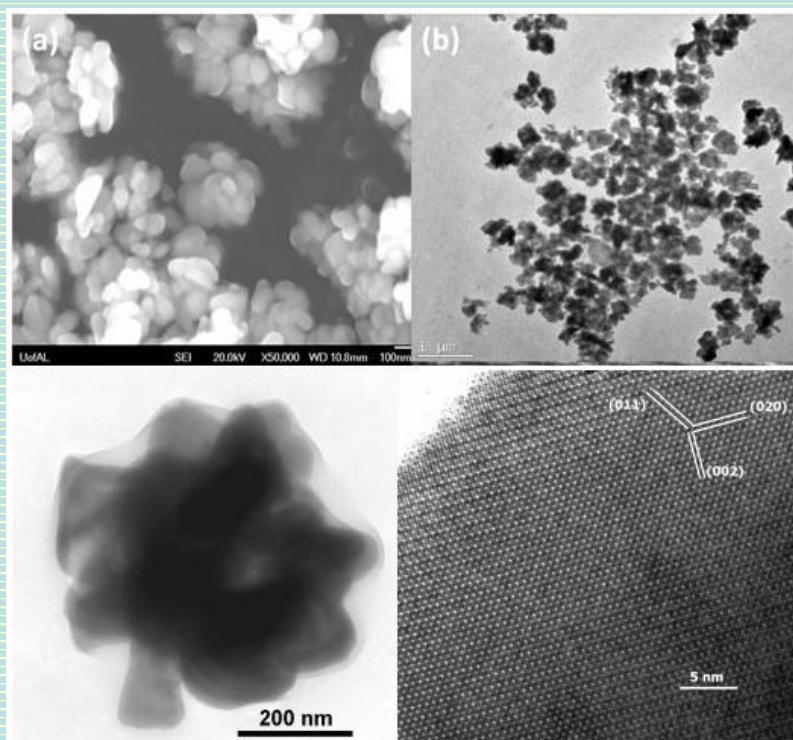


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Magnetic and Semiconducting Oxide and Chalcogenide Nanocrystals



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Monodisperse inorganic nanocrystals have been intensively investigated in recent years, both because of fundamental scientific interest and technological applications arising from the unique properties in reduced dimension. In particular, the spinel ferrites of composition MFe_2O_4 ($M=Co, Ni, Mn, Fe$, etc.) exhibit interesting magnetic and magneto-optical properties that are potentially useful for a broad range of applications, including magnetoelectric devices, drug delivery, ferrofluidics, etc. Their magnetic properties can be systematically varied by changing the identity of the divalent M^{2+} cation or by partial substitution. The properties can additionally be tuned by controlling the shape, size and crystallinity of the nanocrystals. Another class of spinel nanocrystals that remain largely unexplored are the chromium-based spinel chalcogenides, ACr_2X_4 ($A = Cu, Cd$; $X = S, Se$), which are ferromagnetic semiconductors or metals and display unique properties in the bulk. We have synthesized nanocrystals of several spinel ferrites and chalcogenides using facile solution-based methods and investigated their magnetic properties. The synthesis of the chalcogenides has been further expanded to semiconducting nanocrystals of varying compositions and band gaps, such as $CuIn_xGa_{1-x}S_2$, Cu_2ZnSnS_4 , Cu_2FeSnS_4 , and $CuSbS_2$, with different anisotropic shapes and crystal structures. Colloidal suspensions of these nanocrystals are attractive for use as inks for low-cost fabrication of thin film solar cells and supercapacitors by spin or spray coating.



Το προφίλ του ομιλητή

Arunava Gupta is Distinguished University Research Professor and MINT Professor at the University of Alabama (UA). He holds a joint appointment in UA's College of Arts and Sciences and College of Engineering, and is associate director of UA's Center for Materials for Information Technology (MINT Center). Gupta received his undergraduate degree from the Indian Institute of Technology, Kanpur, and Ph.D. degree in chemical physics from Stanford University. Prior to joining UA's faculty in 2004, he worked as a researcher and manager at the IBM Thomas J. Watson Research Center in New York.

Gupta expertise is in investigating thin films and nanostructured materials for use in information technology and energy applications. He has co-authored more than 400 peer-reviewed scientific articles and holds 30 US patents. Gupta is an elected fellow of the American Physical Society, the American Association for the Advancement of Science and the Materials Research Society. In 2010, he received the Humboldt Research Prize awarded by the Alexander von Humboldt Foundation. In 2014 he was awarded the CRSI Medal, given annually by the Chemical Research Society of India. The University of Alabama awarded him the Burnum Distinguished Faculty Award in 2016.