Poster-Th-62 CdSe/CdS hetero-nanocrystals: Synthesis and Optoelectronic Characterization.

Y. Zhao, A. Sugunan, S. Li, M. S. Toprak and M. Muhammed
Division of Functional Materials, Royal Institute of Technology (KTH), Stockholm-16440, Sweden.

Synthesis of colloidal nanocrystals of II-VI semiconductor materials has matured over the past decades and their size dependant optoelectronic properties have been well established. In recent years core-shell quantum dots with type II alignment of band levels, have attracted significant interest due to their potential optoelectronic applications. The main advantage of such heterostructured nanomaterials arise from the spatial separation of excited electrons and holes across the core-shell interface, leading to an increase in the exciton lifetime [1]. Several recent studies report the potential application of CdSe/CdS core/shell nanocrystals in optical gain materials. Utilizing the size dependant changes in the band levels of CdSe and CdS, it is possible to fabricate Type-II quantum dots by tuning the sizes of the core and the shell.
We report a facile synthesis of CdSe/CdS heterostructures using a hot injection process involving rapid introduction of the organometallic precursor complexes into a hot solvent. We have also compared various optical and optoelectronic properties of the nanocrystals with different shell configuration. We describe the effect of different solvents on the growth of the shell. The sample characterization includes transmission electron microscopy (TEM), absorption and photoluminescence spectroscopy.

[1] Y. Nonoguchi et al. Small 5 (2009) 2403

Poster-Th-63 Electrical and optical characterization of Block Copolymers nanostructured thin films.

A. Capretti[1,2], G.P. Pepe[1], G. Miano[2], C. Forestiere[2], C. De Rosa[3], F. Auriemma[3], R. Di Girolamo[3], A. Longo[4], and G. Carotenuto[4]
[1]SPIN-CNR and Univ. Napoli Federico II, Fac. Ingegneria, Dip. Scienze Fisiche, P.le Tecchio 80, 80125 Napoli, Italy; [2]Univ. Napoli Federico II, Fac. Ingegneria, Dip. Ingegneria Elettrica, Via Claudio 21, 80125 Napoli, Italy; [3]Univ. Napoli Federico II, Dip. Chimica, Via Cinthia, Napoli, Italy; [4]IMCB-CNR Piazzale E.Fermi 1, Localit□ Granatello, 80055 Portici(Na), Italy

Block copolymers (BCPs) demonstrated high potentials in nanotechnology due to the controllable scale of the micro-domains and their convenient tunability of size, shape, and periodicity afforded by changing the molecular parameters. The use of the tensorial physical properties of BCPs are very intriguing for several research areas where controlled transport, mechanical, electrical, and optical properties can provide benefits both for fundamental and applied investigations.
We fabricated nanostructured polymeric matrices formed by PS-PMMA thin films structures assembled in cylinders and lamellae, and used as structure-guiding hosts to build nanocomposites where nanofillers are given by functionalized gold nanoparticles (down to ~3nm diameter) dispersed in the highly ordered matrix micro-domains, without breaking the (hexagonal) periodicity. The novel processing methods allowing alignment of BCPs micro-domains in large area ordered patterns are presented and discussed [1].
Morphological and physical characterization data of realized nanocomposites are also presented. In particular, the optical plasmon resonances of such ordered nanocomposites will be investigated by measuring the thin film optical absorbance in the wavelength range 300nm – 900nm. The light scattering properties exhibited by gold nano-spheres arrays, arranged according to the fabricated nano-composites has been also numerically investigated using a semi-analytical approach based on the generalized Mie theory [2].

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[2] Y.L. Xu, Appl. Opt. 34 (1995) 4573-4588

Poster-Th-64 Influence of some anodization parameters on the structure of titania nanotubes

E. AlArfaj[1]
[1] Umm AlQura Univ., Physics department, Aabdiyah campus, Makkah, Saudi Arabia, esaam@yahoo.com

Vertical Titania nanotubes were fabricated by electrochemical anodization of titanium foils. Arrays of self assembled and almost vertically aligned titania nanotubes with diameter ranging between 50-100 nm are grown. Optimizing anodization parameters will lead to better effeciency for dye senstized solar cells and photocatalysis. The effects of solution stirring and the distance between the cathode and the anode on the structure of nanotubes were investigated. It was noticed that changing the distance and the stirring will affect both the growth alignment as well as other structure parameters such as nanotube diameter and length. In this paper a comprehensive study of of these anodization parameters will be carefully analyzed.

Poster-Th-65 Characterization of different sp^2/sp^3 carbon structures obtained by CH_4 insertion in Ar/H_2 gas mixture at HFCVD system.

D. C. Barbosa[1], P. Hammer[2], A. F. Azevedo[1], M. R. Baldan[1], N. G. Ferreira[1], E. J. Corat[1]
[1]INPE, Instituto Nacional de Pesquisas Espaciais, LAS, CP 515, 12227-010, São José dos Campos, SP, Brazil; [2]UNESP, Universidade Estadual Paulista, LEFE, CP 355, 14800-900, Araraquara, SP, Brazil

A comprehensive study on the structural properties of faceted, ballas-like nanodiamond and graphitic films is presented in this work. The films were prepared in a hot-filament chemical vapour deposition system using an argon rich environment (90 vol.%). While the substrate temperature (1023 K) and total pressure (40 kPa) were kept constant the methane concentration was adjusted to 0.25, 0.5, 1, 1.5 to 2 vol.%, balanced with hydrogen to a total flux of 200 sccm. The morphology of the samples was evaluated by scanning electron microscopy (SEM). The relative concentration of sp^2 and sp^3 bonds was determined by visible-Raman scattering. The crystallinity and grain sizes were studied by X-ray diffraction. The wettability of the surface was measured by contact angle measurement and the chemical bonding structure was analyzed by x-ray photoelectron spectroscopy (XPS).
The CH_4 insertion promotes a morphology changes at faceted diamond, ballas-like nanodiamond to graphitic film. And also promotes a decrease behavior at sp^3 and sp^2 carbon bonds ratio (see in Raman spectra), wettabillity and the grain sizes. The obtained results allowed a detailed insight on the structure and morphologies of faceted diamond, ballas-like nanodiamond and lamellar graphitic phase, commonly referred to as nanographitic. In the structural framework, the viability of the determination of the sp^3 to sp^2 ratio from the XPS carbon core level spectra was evaluated in critical discussion.