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ΠΑΡΟΥΣΙΑΣΗ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

Τίτλος:

«Low temperature synthesis and characterization of 0D metal halide nanocrystals & nanoparticulate films»

Παντελαίου Μιχαήλα-Ακαθή

Φοιτήτρια

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Abstract:

Metal halide perovskites are nowadays under intensive research effort in semiconductor nanocrystals scientific field. Low-cost solution based synthesis and energy bandgap tunability, make them compelling candidates for numerous applications such as lighting emitting diodes (LEDs), photovoltaics, supercapacitors, batteries and detectors. The purpose of this thesis is the low temperature fabrication and characterization of Cs_4PbBr_6 (0D) dispersions and nanoparticulate thin films, as a first step for the implementation of nanocrystals in energy applications. These Cs_4PbBr_6 hexagonal nanocrystals were synthesized by the co-precipitation method and optical, and structural characterizations of the material were carried out by UV-Visible (UV-Vis) and Photoluminescence (PL) spectroscopy, Transmission Electron Microscopy (TEM) and X-Ray Diffractometry (XRD). Nanoparticulate films were fabricated by spin coating method in Indium Tin Oxide (ITO) and Soda lime glass substrates and characterized by XRD, Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), UV-Vis and PL spectroscopy. Cs_4PbBr_6 is a wide energy gap semiconductor with 3.9 eV energy gap and rhombohedral structure. PL peak appearance at 514nm in Cs_4PbBr_6 nanocrystals is due to $CsPbBr_3$ nano-inclusions. The best nanoparticulate film uniformity achieved on ITO glass substrate with average roughness of 22.8 nm. There was no obvious structural alteration of nanocrystals during the spin coating deposition. The energy gap of the thin film on ITO substrate was calculated at 3.7eV, while photoluminescence was recorded at 524nm.