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ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

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ΑΝΑΚΟΙΝΩΣΗ

ΠΑΡΟΥΣΙΑΣΗ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

Τίτλος

«Synthesis and Characterization of $(CH_3NH_3)_{1-x}(HC(NH_2)_2)_XPbI_3$ Perovskite Solar Cells»

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Πέμπτη 4/3/2021, και ώρα: 12:00

Link τηλεδιάσκεψης: https://virtconf.materials.uoc.gr/b/sta-8ka-gha-prz

Η παρουσίαση θα πραγματοποιηθεί με τηλεδιάσκεψη σύμφωνα με το τρίτο άρθρο, παρ. 1, της με αριθμ. 115744/Z1/4.9.2020 Κοινής Υπουργικής Απόφασης (Β΄3707).

Περίληψη:

The photovoltaics of organic - inorganic lead halide perovskite materials have shown rapid improvements in solar cell performance, surpassing the top solar cell efficiency of inorganic semiconductor compounds such us CdTe and ($CuIn_{1-x}Ga_xSe_2$) CIGS, as well as organic semiconductors, in just about a decade. Perovskite preparation via simple and inexpensive solution processes demonstrates the immense potential of this thin-film solar cell technology to become a low-cost alternative to the presently commercially available photovoltaic technologies.

In this Diploma Thesis, we have studied the solid solution $(CH_3NH_3)_{1-x}(HC(NH_2)_2)_xPbI_3$ in terms of thin film fabrication and photovoltaic device optimization. The reason for choosing this particular system, besides the promising precedence,[1] is the realization that the original and most-widely studied $CH_3NH_3PbI_3$ (x = 0) is prone to hydrolysis of the primary ammonium cation and formation of solvent (including water) adducts that have a detrimental effect in the device performance. On the other hand, $HC(NH_2)_2PbI_3$ (x = 1) is rather immune to hydrolysis due to the conjugated nature of the amidinium cation as well as its significantly smaller permanent dipole moment. Unfortunately, the thermodynamic phase of $HC(NH_2)_2PbI_3$ at ambient condition is a non-perovskite polymorph (so-called δ-phase) which has poor photo-conducting properties. By alloying the two phases we seek to stabilize the perovskite phase of $HC(NH_2)_2)PbI_3$ by reducing the volume of the organic cation in the perovskite cavity, while keeping the content of the primary ammonium cations to a minimum amount. The present Thesis will concern the synthesis and characterization of the raw perovskite materials, the optimization of thin-film fabrication under variable deposition conditions, as well as the demonstration of complete photovoltaic solar cell devices obtained from the optimized perovskite thin-films.