

ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ
ΠΑΡΟΥΣΙΑΣΗ ΜΕΤΑΠΤΥΧΙΑΚΟΥ ΔΙΠΛΩΜΑΤΟΣ ΕΙΔΙΚΕΥΣΗΣ

Τίτλος

«Plasmonic Organic Photovoltaics»

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Πανεπιστήμιο Κρήτης

Abstract

The effects of incorporating uncapped aluminum (Al) nanoparticles (NPs), fabricated by laser ablation in liquid, in the hole transport layer (HTL) of organic photovoltaic devices were systematically investigated. The integration of Al NPs in the poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate) (PEDOT:PSS) hole transport layer resulted in about 9% enhancement in the power conversion efficiency. This improvement can be attributed to a combination of optical and electrical effects. In particular, light trapping inside the photoactive layer takes place due to scattering of the incident light at wide angles by the embedded Al NPs. At the same time, the electrical conductivity of the HTL becomes enhanced, which in effect improves the hole collection and establishes a mobility balance. These findings were supported by spectroscopic analysis and photon to-electron conversion efficiency measurements of the respective devices.