



Contribution ID: 225

Type: Oral Presentation

Properties of photoactive organic/inorganic hybrid thin films for solar cell applications

Wednesday, 5 July 2017 15:00 (20 minutes)

Photoactive organic/inorganic hybrid thin films have been fabricated by spin coating a mixture of polymer/fullerene blended with silicon nanowires at different volume ratios. The main challenge faced by organic solar cells is poor stability leading to premature degradation of solar cell morphology and electronic properties which result in poor efficiencies. The incorporation of n type Si NWs into organic thin films enhances properties and improves stability of such films.

Surface morphology analysis of the hybrid thin films using optical microscopy and scanning electron microscopy exhibited a nonhomogeneous thin film with evenly distributed Si NWs which form random clusters. Structural information obtained from the grazing incidence XRD showed minimal peak shifting and an increase in lattice strain with varying Si NW ratios. Chemical analysis from X-ray photoelectron spectroscopy did not show the presence of Si due to sensitivity limitations. The UV-Vis absorption of the hybrid thin films was found to improve with the addition of Si NWs while the photoluminescence increased due to the porous and highly defective nature of the MACE Si NWs. Hall-effect measurements on the samples showed improved mobility and conductivity of the hybrid thin films.

Summary

this work focuses on the fabrication of organic/inorganic hybrid thin films for solar cell applications. these films were synthesized by mixing P3HT/PCBM with Si NWs at different ratios and then spin coated on ITO substrates. these films were then characterized using a wide range of techniques in order to establish their properties.

Apply to be considered for a student award (Yes / No)?

yes

Level for award (Hons, MSc, PhD, N/A)?

PhD

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

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Session Classification: Physics of Condensed Matter and Materials 1

Track Classification: Track A - Division for Physics of Condensed Matter and Materials