TALK

Speaker: Dr. Raja Bhaskar Kanth Siram

Title: Investigation of Phase separation in Bulk-Heterojunction Solar cells via Self Assembly approach and Deposition of Metal Free Electrodes for Perovskite Solar Cell Applications from Simple Aqueous Solutions

Date: 06th, February, 2017

Time: 11:30 AM to 12:30 PM

Place: Samtel Centre Seminar Room (access from ground level)

Abstract: Exciton diffusion length in organic semiconducting materials is around 1020 nm whereas the thickness of the active layer is around 100-200 nm. So optimization of the blend film of the active layer is necessary for the effective separation of charge carriers. We studied the effect of the self-assembled organic semiconductors in solar cell applications. Perovskite solar cells have recently become a focus of interest because they can potentially be fabricated as lightweight flexible coatings over large-area flexible substrates using low cost solution processing techniques. Commonly used anode material is the gold which migrate through the HTL to the perovskite film and undergo irreversible degradation. To overcome this issue researchers are working on the carbon based electrodes. We are developed a simple hybrid carbon membranes which are easily transferrable on to the perovskite cells. We have fabricated various sizes of carbon membranes and utilized these to study the PCE and stability of perovskite solar cell. We have achieved better efficiency of 5.8% by using these membranes as compared to its counter gold electrodes 5.0%. The stabilities of the cells were monitored by measuring the photocurrent densities at an applied bias close to the initial maximum power point as a function of time. The devices with hybrid membrane gave almost no degradation for the continuous illumination of AM 1.5 for 7 hr whereas the standard gold electrode undergoes around 15% degradation. Further aging studies were carried out in ambient air under relative humidity (RH) of 60−70%, every couple of days for 2 month. Between measurements, the devices were kept in a dry air atmosphere (in the dark) with a RH of ∼15−20%. Gold electrode devices showed the significant decay in all parameters whereas carbon membrane devices showed the significant stability over 2 month. These results indicate that the hybrid carbon membranes are better in terms of stabilities and cost effective as well as simple to fabricate in large areas as compared to gold electrode.

Brief biot: Dr. Raja Bhaskar Kanth Siram working as a post-doctoral fellow in Weizmann Institute of science, Rehovot, Israel. He completed his doctorate degree from Indian Institute of Science, Bangalore, India. His research interests are the design and study of third generation photovoltaic devices.