



SOLAR QUEST

SEMINAR ANNOUNCEMENT

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INSIGHTS INTO MODE OF OPERATION OF HYBRID ORGANIC-INORGANIC PEROVSKITE SOLAR CELLS

DATE: Thursday, January 29, 2015

TIME: 11:30 am - 12:30 pm

PLACE: Seminar Room A-502
CCR Building, 5F

ABSTRACT

With solution-processed, organic-inorganic hybrid lead halide perovskite-based solar cell developments being meteoric over the last few years, how these solar cells work is of fundamental interest. Here we will describe the insights that we have gained from several measurement approaches that are less common among those mostly employed, viz. Electron Beam Induced Current (EBIC), a scanning electron microscopy-based technique, applied to cell cross-sections, Surface photovoltage spectroscopy (SPS) on partial and complete cells, aided by several photoelectron spectroscopic measurements and scanning probe measurements. For thin film, non-mesoporous cells the best model remains that of a solar cell with a low-doped, high electronic quality photovoltaic semiconductor layer between a p- and an n-layer, a less common type of “p-i-n” cell. Under certain conditions, if the cell is very thin, it will become hard to distinguish this readily from a p-n cell, except by way of scanning probe methods. This model alongside the high effective diffusion lengths we measured in working cells, rather than the more common, but indirect approach of optical spectroscopy, explains the remarkably high open circuit voltage (V_{OC}) to E_{gap} obtained with these cells.

Collaboration with Prof. Gary Hodes.

Most of the work was done with / by former group members Drs. Eran Edri, Saar Kirmayer. Parts were done with Prof. Boris Rybtchinski, Dr. Yaron Tidhar, Dr. Lee Barnea and Michael Kulbak at the Weizmann Inst., with Prof. Antoine Kahn and Dr. Philip Schulz (Princeton Univ.) and with Aditya Sadhanala, Dr. Felix Deschler and Prof. Richard Friend (Cambridge Univ.)

