Hebrew University center for Green Energy Seminar

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Metal Halide Perovskite Interface Reactivity: Towards Understanding Degradation and Doping

THE HEBREW UNIVERSITY OF JERUSALEM

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Seminar Hall, Los Angeles Building
Gathering & Refreshments at 14:45

Abstract

Metal halide perovskite semiconductors have captured significant interest in the thin film optoelectronics community. As one example, certified photovoltaic efficiencies of metal halide perovskite solar cells currently exceed 27%, making them competitive in the laboratory with well-established technologies like crystalline Si, CdTe, and CIGS. Also recently, gains have been made in perovskite-based light emitting devices (LEDs), with external quantum efficiency (EQE) beyond 25% realized for bromide (green) and iodide (red/near-infrared) based perovskite emission layers. But in order to better understand the physics of device operation as well as degradation, we need to understand what can occur at interfaces of halide perovskites with other materials. For example, we have determined that metal halide perovskites not only feature mixed ionic-electronic motion but are also considerably chemically reactive, for example via redox (electron transfer) or acid-base (proton transfer) reactions. We have found these processes responsible for metal contact and ITO corrosion/etching, for iodine transport into hole transport layers, for halide phase segregation, and even for Au transport. In addition, it may be possible to exploit this reactivity to allow for doping, with important implications on perovskite optoelectronic devices.