Metal-Oxide Based Interlayers for Organic and Perovskite Photovoltaics

Thin-film solar cells including both organic (OSC) and perovskites (PSC) devices have emerged as an excellent alternative to the traditional silicon wafer technology in the field of photovoltaic technologies. The basic materials used in these devices provides the solar cells with unique properties such as low weight, semi-transparency, mechanical flexibility and potentially low cost, which in turn opens up for completely new application areas. OSC has recently achieved power conversion efficiencies (PCE) of more than 13%, and PSC has shown an outstanding PCE of more than 22%, whereas in both cases, their stability still lacks significant improvements.

This work is dedicated to research on improving the performance, including device stability, of organic and perovskite solar cells, using novel metal-oxide based interlayers. The work initial focus on the fabrication and optimization of DBP/C_{70} organic cells, where new developments towards integration of OSC for usage in low-power consuming electronics is shown. Integration of novel reactive sputtered Molybdenum oxide (MoO_x) layers will be demonstrated as a new method to improve the stability of these organic solar cells, while maintaining a high device performance. Based on the analysis on OSC devices, new metal-oxide based interlayers for PSC devices are also investigated showing promising device results.