AKE 5: Photovoltaics: Novel Approaches

Time: Monday 15:00–15:30 Location: B 0.014

Invited Talk AKE 5.1 Mon 15:00 B 0.014

Current developments and perspectives for polymer-based and metal-halide perovskite solar cells — •Thomas Kirchartz — IEK5 Photovoltaik, Forschungszentrum Jülich GmbH, 52428 Jülich — Faculty of Engineering and CENIDE, University of Duisburg-Essen, Carl-Benz-Str. 199, 47057 Duisburg, Germany

The talk summarizes recent developments in polymer and metal-halide perovskite based solar cells and gives an overview over future challenges in basic understanding and device engineering. The development of polymer-based solar cells for years has been focused on optimizing the donor molecule (typically a polymer) which was then blended with fullerenes that served as the electron accepting molecule. Optimizing of the energy levels of the donor molecules lead to efficiencies of about 11% but also to a stagnation of progress in recent years. Variation and optimization of the acceptor molecule was frequently attempted but was successfully incorporated only within the last two years in the form of a new class of small molecule acceptors that have quickly lead to promising new efficiencies of ~ 13%. In the case of metal-halide perovskites the efficiency development was extremely fast with the high open-circuit voltages being a peculiar feature for which a multitude of explanations was presented and discussed in the literature. Here we discuss the possible impact that relatively heavy elements such as Pb and I may have on non-radiative recombination as opposed to the situation in organics where light elements (in particular C) control the energy of vibrational modes.