

Plenary Talk

PLV IX Thu 14:00 HSZ 01

Metal Halide Perovskites for Photovoltaic Applications —

•LAURA HERZ — University of Oxford, Department of Physics, Parks Road, Oxford OX1 3PU, U.K.

Organic-inorganic metal halide perovskites have emerged as attractive materials for solar cells with power-conversion efficiencies now exceeding 25%. This talk will provide an overview of our work unravelling the fundamental processes that have enabled these materials to be such efficient light-harvesters and charge collectors, examining e.g. fundamental mechanisms underpinning charge-carrier mobility and recombination. Our analysis of intrinsic photophysical parameters opens the

promise of targeted material design for solar energy harvesting, based on readily accessible parameters, such as band structure, phonon frequencies and the dielectric function.

We further discuss a range of remaining challenges and opportunities relating to material microstructure, ionic migration and toxicity. We examine how the optoelectronic properties of hybrid perovskites are governed by their nanostructure and structural phases. In the context of silicon-perovskite tandem cells, we discuss the peculiar mechanisms underlying detrimental halide segregation in mixed iodide-bromide lead perovskites with desirable electronic band gaps near 1.8eV. We further outline the challenges and rewards of lead-free metal halide perovskites and their structural derivatives.