

ION MIGRATION ON HALIDE PEROVSKITE MICROSTRUCTURE DEVICES

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The vertiginous advance in conversion efficiency in perovskite solar cells (PSCs) comes with reactive mobile halide ions affecting the performance of the cells. The effect of the distribution of mobile ions under working conditions modifies the properties of the cell and has to be considered when analyzing the results of experimental observations. Ion Migration is characterized by its mobility (or diffusion coefficient), thermal activation energy and volume concentration. To study ion migration, different time-dependent techniques have been applied on perovskite-based nano- and micro-structures.[1, 2] Recently, ion migration was studied in 2D and 2D/3D lead halide perovskites by using scanning Kelvin probe microscopy (SKPM).[2] In these experiments, the perovskite semiconductors were sandwiched between two insulator layers, and two electrodes of gold were deposited on the top insulator, favouring the migration of ions after applying a voltage difference between them. The experimental results showed that the dimensionality of the perovskite impacts the ion migration. In this work, we go beyond, and we coupled their experimental results and a drift-diffusion model [3] which includes ion migration. From modelling, we analyze what parameters are feasible to be extracted from this experimental setup focusing on the ion mobility and ion concentration. These findings provide a basis for understanding bias-dependent ion motion in perovskites.

[1] Gottesman et al. *Chem*, 1 (5) 2016, 776-789

[2] Jiang et al. *ACS Energy Lett.* 2021, 6, 100-108

[3] Yong et al. *Journal of Photonics for Energy.* 2020 10(2):024502