

Are Mobile Ions Bad for Perovskite Solar Cells?

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The dual electronic-ionic nature of perovskite solar cells has greatly complicated their characterisation; impacting almost all of our 'standard' PV characterisation techniques. For example, when ions move on the timescale of current-voltage measurements, they can act to modify carrier recombination rates and carrier extraction, influencing the shape of the response. Ions can also modify fast measurements, where the 'frozen in' ion distribution impacts the electronic response of the device. The prevailing narrative in the literature is that the presence of these mobile ions is bad for perovskite solar cells, whether leading to field screening that lowers efficiency or contributing to material degradation. In this presentation I will consider whether ions are always bad for our devices, or whether they can also be beneficial. I will introduce our electrochemical measurements where we use ions as diagnostic probes inside perovskite solar cells. Finally, the talk will look at whether we can design cells differently to better take advantage of the intrinsic ionic properties of perovskite materials.