Physical properties and photostability of 3D and 2D Ruddlesden-Popper perovskite materials for photovoltaic applications

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Solution-processed organometallic perovskite based solar cells have emerged as a promising thin-film photovoltaic technology. There have been few reports on the photo-stability of such devices, attributing the hysteresis and performance degradation to various phenomena, including photo-degradation and fast self-healing of the photocurrent in large grain perovskite solar cells of the 3D methyl ammonium (MA) lead iodide materials under constant illumination.[1] The polaronic picture proposed recently is related to contributions from both the inorganic and the organic parts of the material.[2]

Layered perovskites obtained by the same growth procedure recently report a record photovoltaic efficiency of 12.52 % with no hysteresis, more than two times higher than previously reported values.[3] Intrinsic quantum and dielectric carrier confinements,[4] and protection afforded by the organic inner barriers in the 2D Ruddlesden-Popper phases, may explain their exceptional photostability under standard illumination as well as humidity resistance over 2000 hours.[3]

References

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