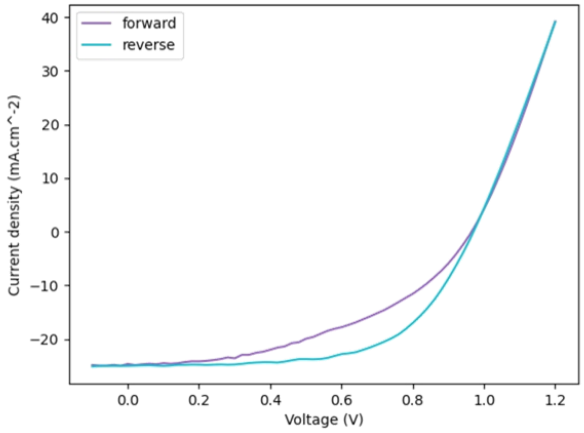
Quantum SOLUTIONS™

Perovskite Powders for Solar Cells

Perovskite materials have attracted considerable interest for their impressive efficiency in photovoltaics. In laboratory scale devices using these materials, Perovskite solar cell efficiencies have increased. In single junction architectures they have gone from being 3.8% in 2009 to 25.5% in 2020, and in silicon based tandem cells that figure has reached 29.15%. Perovskite solar cells have the potential of achieving even higher efficiencies at very low production costs, and are therefore have become an attractive commercial option. Quantum Solutions offers perovskite ABX3 powders as a precursors for solar cell fabrication. In comparison with mixing of halide precursors, high crystallinity ABX3 powders offer higher control of purity and stoichiometry, enabling the fabrication of higher efficiency solar cell devices.

1. SOLAR CELLS USING HALIDES:

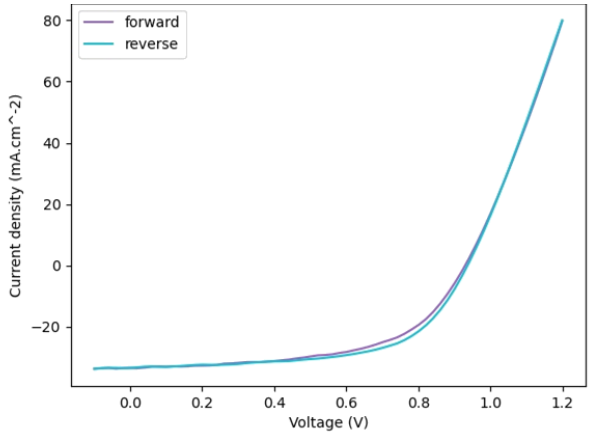
Perovskite Solar Cells with area 0.151 cm^2 where the active layer was $(FAPbI3)_{0.95}(MAPbBr3)_{0.05}$ was prepared from halides precursors:
FAI+PbI2+MABr+PbBr2



Measurement	Jsc (mA/cm^2)	Voc (V)	FF (%)	PCE (%)
Best device (forward scan)	-24.80	0.97	45.22	10.82
Best device (reverse scan)	-24.98	0.97	60.89	14.77
Average device (forward scan)	-18.12	0.81	39.90	8.33
Average device (reverse scan)	-18.22	0.82	50.73	10.89

2. SOLAR CELLS USING ABX3 POWDERS:

Halide precursors from #1 are used to make Perovskite ABX3 powders. Then FAPbI3 and MAPbBr3 are used to fabricate solar cell $(FAPbI3)_{0.95}(MAPbBr3)_{0.05}$ (area 0.151 cm^2).



Measurement	Jsc (mA/cm^2)	Voc (V)	FF (%)	PCE (%)
Best device (forward scan)	-33.44	0.93	56.70	17.64
Best device (reverse scan)	-33.35	0.94	60.56	18.91
Average device (forward scan)	-25.47	0.88	52.34	12.46
Average device (reverse scan)	-25.56	0.89	56.39	13.61

Products portfolio:

- Perovskite ABX3 Powders

Solar Cells fabricated from Perovskite ABX3 powders demonstrate higher PCE efficiency and higher current density than the same solar cells prepared using just halide precursors.

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