

Exploring performance limits toward 20.79% efficiency in 2D layered Ruddlesden-Popper perovskite solar cells

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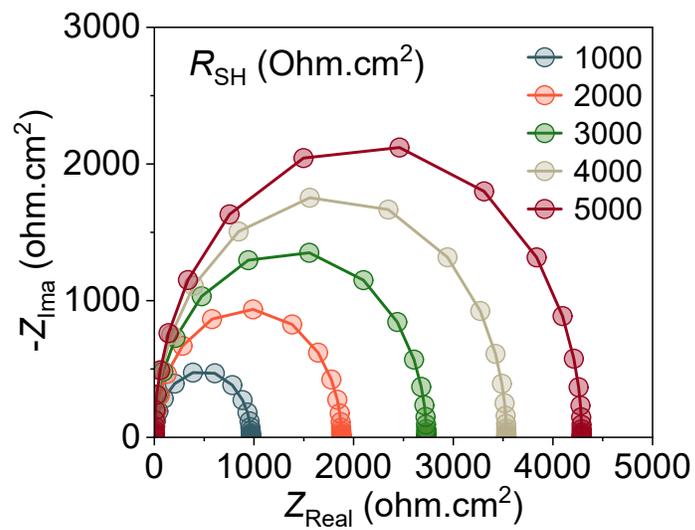


Figure S1: Nyquist plots for varying shunt resistance of 2DRP-based PSCs.

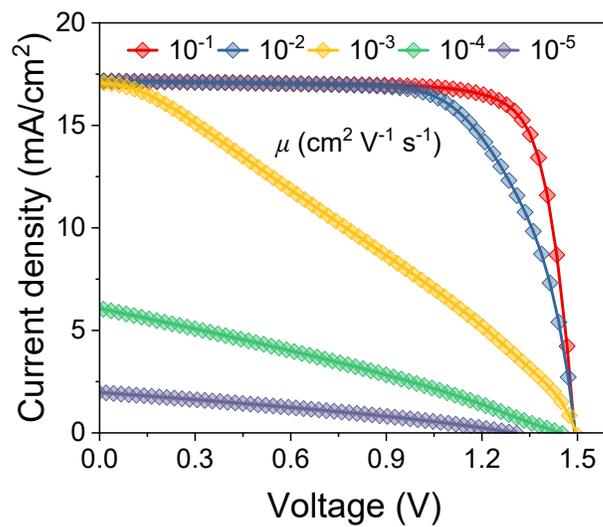


Figure S2: *J-V* curve of 2DRP-based PSC with different charge mobilities.

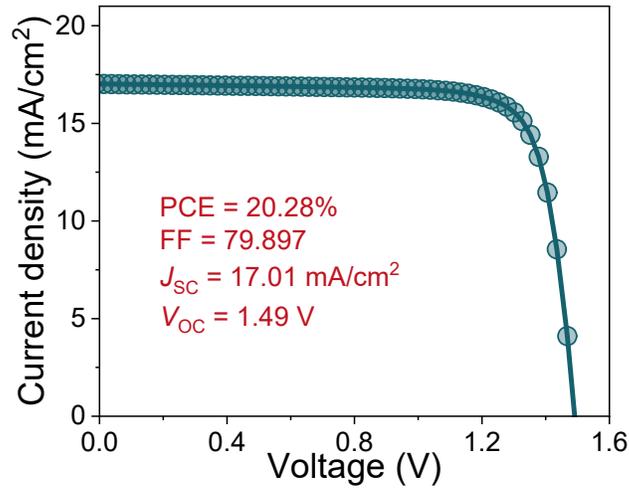


Figure S3: *J-V* curve of 2DRP-based PSC with including 300-nm-thick FTO in SCAPS-1D.

Table S1. The key parameters of PSC at interfaces.

Parameters/Interfaces	FTO/TiO ₂	TiO ₂ /(MTEA) ₂ (MA) ₄ Pb ₅ I ₁₆	(MTEA) ₂ (MA) ₄ Pb ₅ I ₁₆ /spiro-OMeTAD
Defect type	Neutral	Neutral	Neutral
Capture cross section for electrons (cm ²)	1.0 × 10 ⁻¹⁹	1.0 × 10 ⁻¹⁹	1.0 × 10 ⁻¹⁹
Capture cross section for holes (cm ²)	1.0 × 10 ⁻¹⁹	1.0 × 10 ⁻¹⁹	1.0 × 10 ⁻¹⁹
Energetic Distribution	Single	Single	single
Reference for defect energy level E_t	Above the highest E_v	Above the highest E_v	Above the highest E_v
Energy with respect to reference (eV)	0.600	0.600	0.600
Total defect density (1/cm ²)	1.0 × 10 ¹⁰	1.0 × 10 ¹⁰	1.0 × 10 ¹⁰