Supplementary Information

Increased Efficiency for Perovskite Photovoltaics via Doping the PbI_2 Layer

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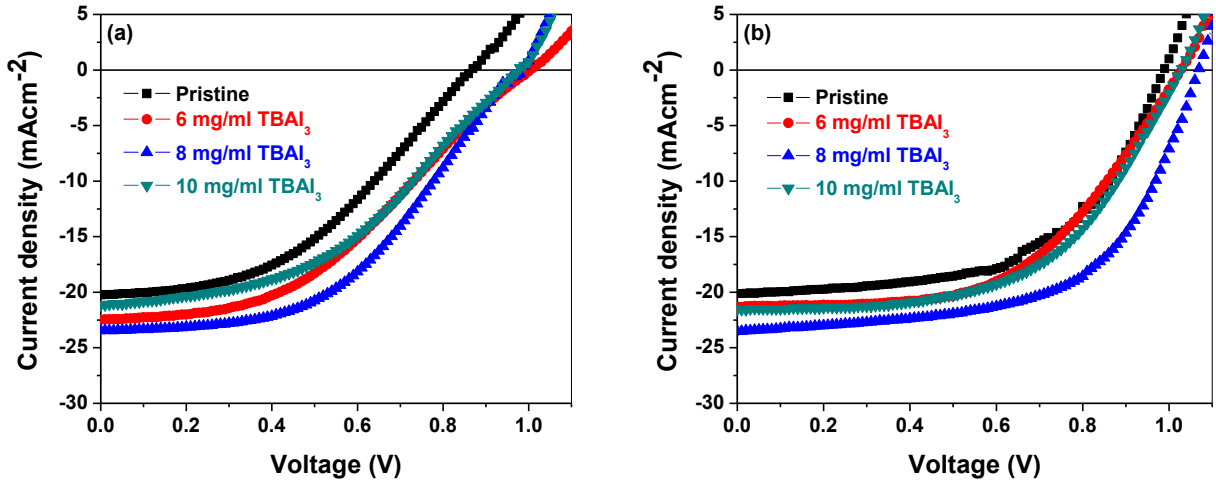

Figure S1. (a) Forward and (b) reverse current density-voltage (J-V) characteristics of perovskite solar cells made from pristine and different concentration (6, 8, 10 mg/ml) of $TBAI_3$ doped perovskite films.

Table S1. Photovoltaic parameters of fabricated perovskite solar cells made from pristine and different concentration (6, 8, 10 mg/ml) of $TBAI_3$ doped perovskite films.

Devices	Scan	Jsc ($mAcm^{-2}$)	Voc (V)	FF	η (%)
Pristine	Forward	20.25	0.87	0.43	7.6%
	Reverse	20.12	0.99	0.56	11.18%
6 mg/ml $TBAI_3$	Forward	22.48	1.00	0.41	9.28%
	Reverse	21.27	1.03	0.54	11.75%
8 mg/ml $TBAI_3$	Forward	23.45	0.99	0.47	10.92%
	Reverse	23.52	1.07	0.59	14.85%
10 mg/ml $TBAI_3$	Forward	21.16	0.98	0.43	9.00%
	Reverse	21.59	1.03	0.55	12.27%

Figure S1 shows the J-V characteristics of perovskite solar cells made from pristine and perovskite films doped with different concentrations (6, 8, 10 mg/ml) of $TBAI_3$ in the PbI_2 precursor. Table S1 shows photovoltaic parameters including short circuit current density (J_{sc}), open circuit voltage (V_{oc}), fill factor (FF) and efficiency (η) obtained from the fabricated solar cells. It was observed that by increasing concentration of $TBAI_3$ additive in perovskite films, there was enhancement in J_{sc}, V_{oc} and η up to 8mg/ml compared to solar cells made from pristine perovskite films, beyond 8mg/ml, these parameters start to decrease. An optimum efficiency (η) of 14.85% was observed for the 8 mg/ml $TBAI_3$ doped perovskite based device, which is significantly improved as compared to the efficiency of 11.18% obtained from device made from pristine perovskite films.