Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Figure S1: *Digital images of excess PbI2 precursors by using 2.0, 2.5, 3.0 and 3.5 g in 5 ml DMF.*

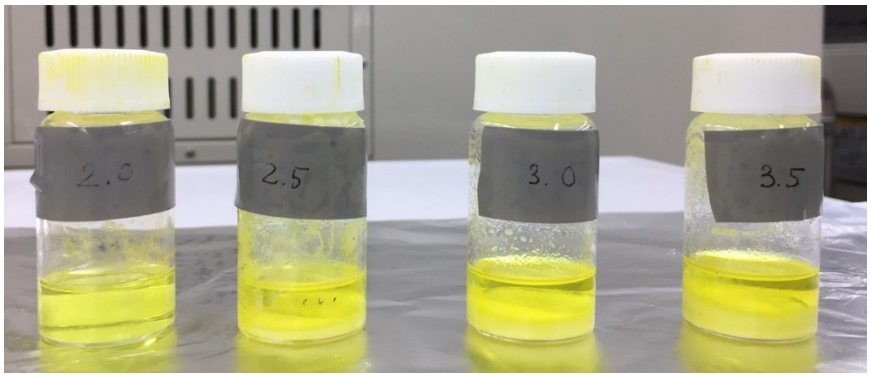


Figure S2: *Top-view SEM images of perovskites fabricated from PbI_2 concentration of 0.7 g/ml spun at 1000 rpm for 15s, and followed by dropping MAI.*

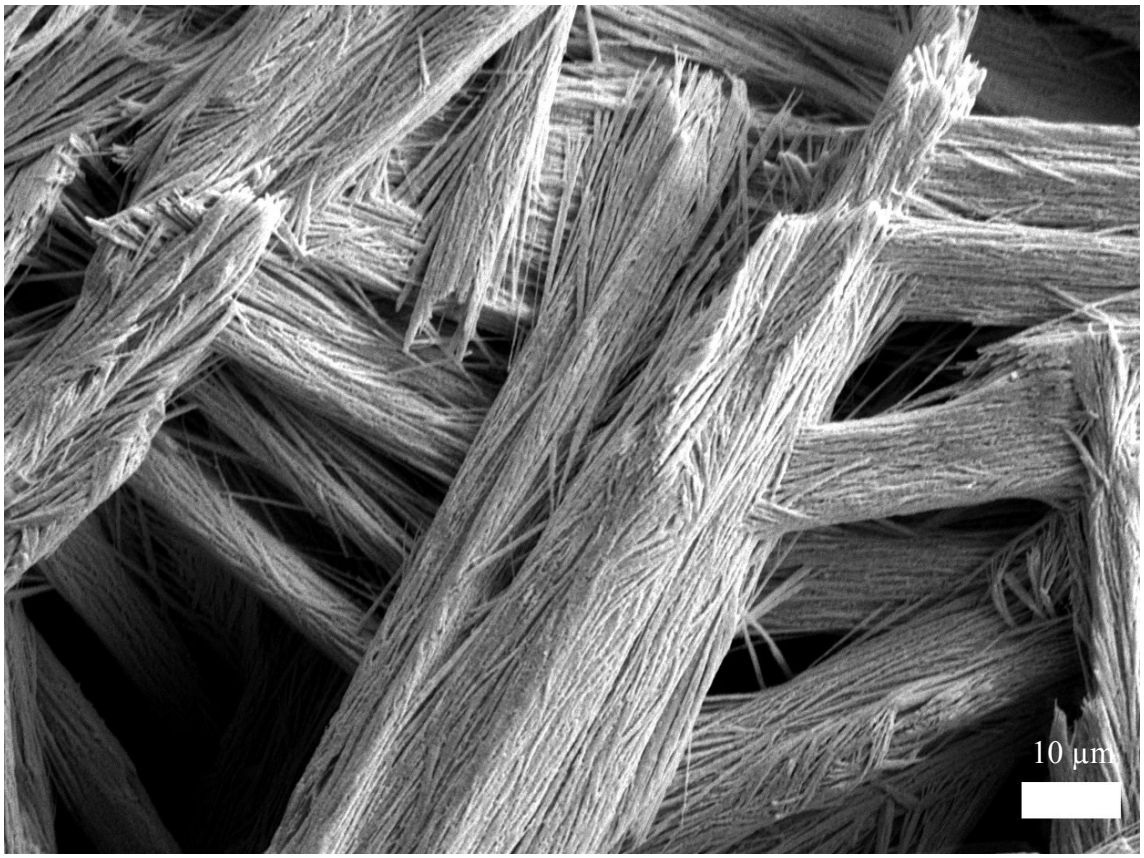
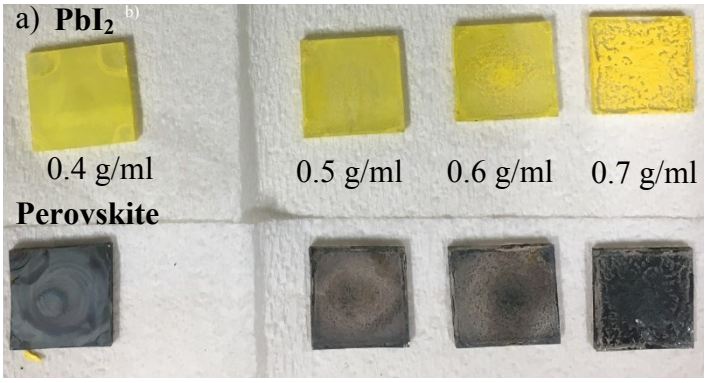
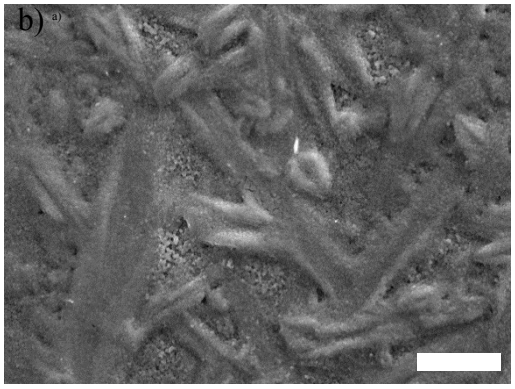
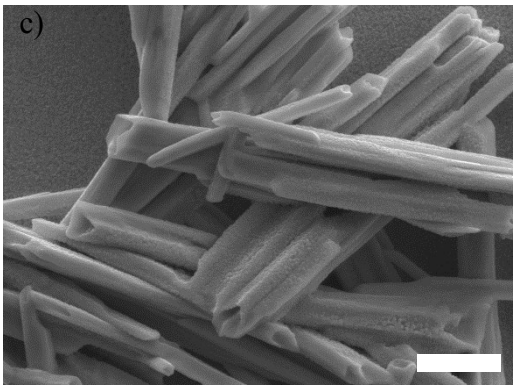
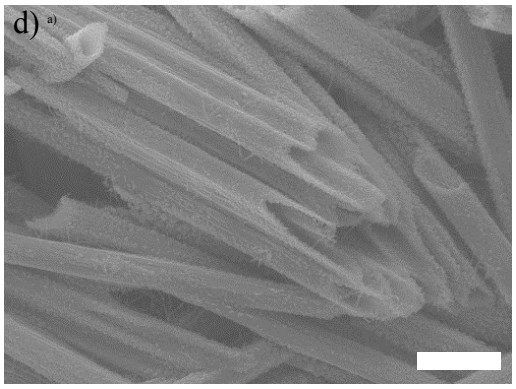


Figure S3: *a) Digital image of PbI_2 with different concentration of 0.4, 0.5, 0.6 and 0.7 g/ml and corresponding perovskite on FTO; b), c), d) and e) Top view SEM images of perovskites formed by PbI_2 concentration of 0.4, 0.5, 0.6 and 0.7 g/ml;*









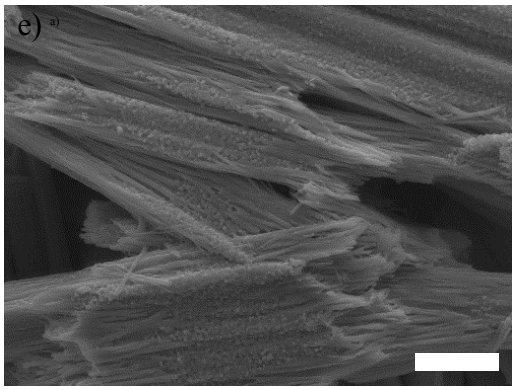


Figure S4: *EDS measurement of all perovskites formed by PbI_2 concentration of 0.4, 0.5, and 0.6 g/ml.*

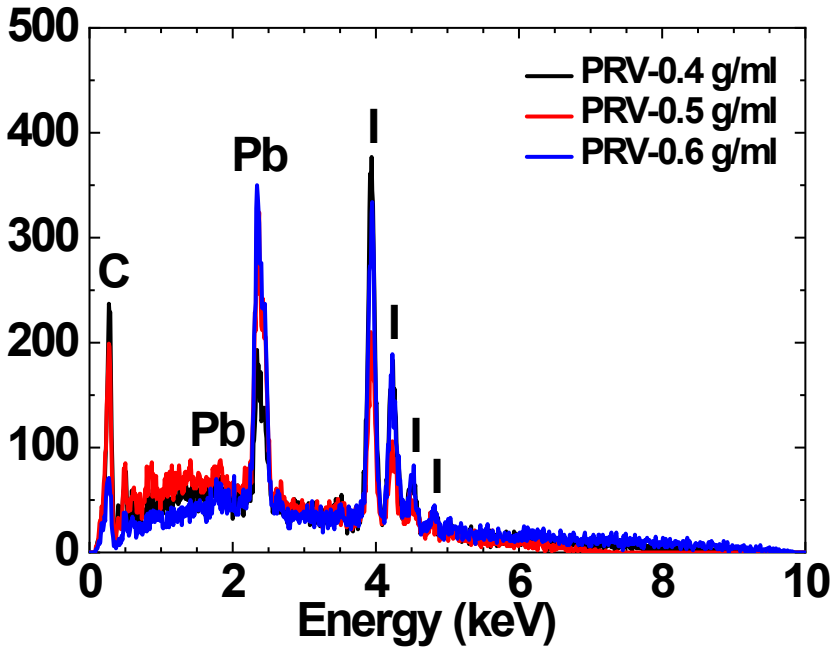


Table 1: *Elements extracted from perovskites fabricated from PbI_2 concentration of 2.0/5, 2.5/5, 3.0/5 and 3.5/5 g/ml spun at 1000 rpm for 15s*

	C (%)	O (%)	I (%)	Pb (%)
2.0 g	8.20	0.74	76.65	14.41
2.5 g	3.49	0.61	62.82	33.08
3.0 g	3.03	0.28	61.39	35.31

Figure S5: *Decay curves of PbI2 extracted from carrier lifetime measurement by μPCD under injection levels of 2.5×10^{13} cm^{-3} at wavelength of 349 nm and frequency of 26 GHz.*

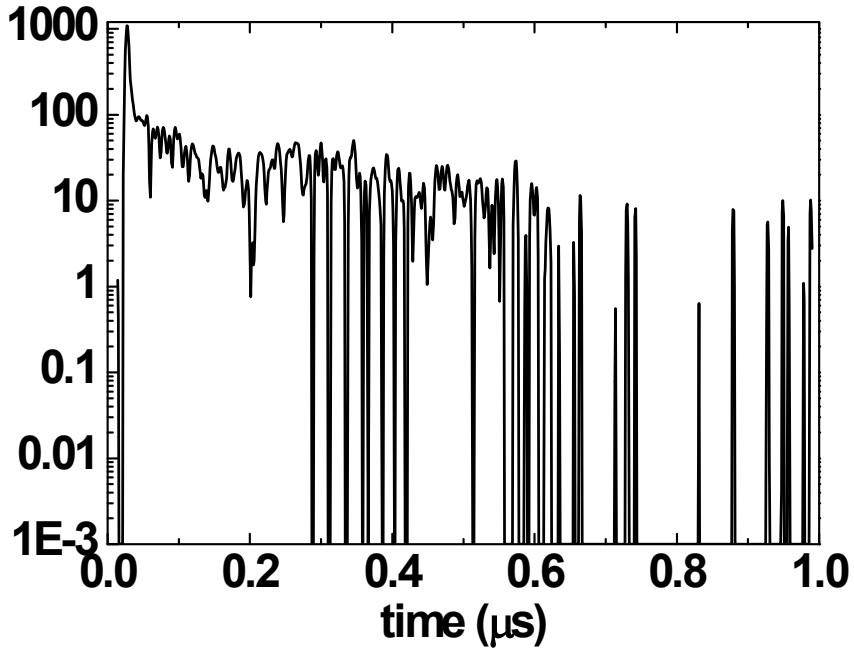


Figure S6: *Mapping of carrier lifetimes of perovskites formed by PbI_2 concentration of 0.5 g/ml spun at 4000 rpm for 15 s.*