Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A. This journal is © The Royal Society of Chemistry 2018

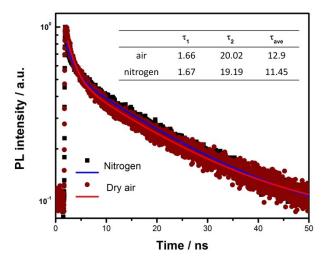


Figure S1. Transient photoluminescence of perovskite on glass prepared under different atmospheres.

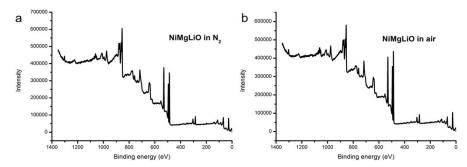


Figure S2. Survey spectra of NiMgLiO films annealed under different atmospheres.

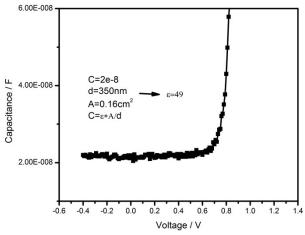


Figure S3. Dielectric constant derived from C-V measurement.

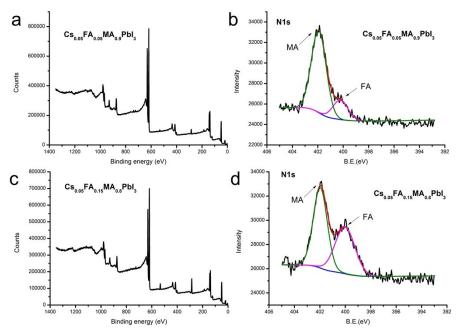


Figure S4. XPS spectra of $Cs_{0.05}FA_xMA_{0.95-x}PbI_3$. (a) Survey spectra of $Cs_{0.05}FA_{0.05}MA_{0.9}PbI_3$ film. (b) N1s spectra of $Cs_{0.05}FA_{0.05}MA_{0.9}PbI_3$. (c) Survey spectra of $Cs_{0.05}FA_{0.15}MA_{0.8}PbI_3$ film. (b) N1s spectra of $Cs_{0.05}FA_{0.15}MA_{0.8}PbI_3$.

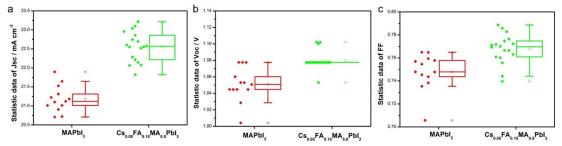


Figure S5. Statistic values of the fabricated perovskite solar cells. (a) J_{SC} , (b) V_{OC} , (c) FF.