Supporting Information:

**Identifying the charge generation dynamics in a Cs⁺-based triple cation mixed perovskite solar cells**

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Fig. S1: Section profiles of CFM images: topography: (a,c,e) in dark, (b,d,f) under green light, and current: (a’,c’,e’) in dark, (b’,d’,f’) under green light- of (MA₀.₁₅FA₀.₈₅)Pb(I₀.₈₅Br₀.₁₅)₃, Cs₀.₀₅(MA₀.₁₅FA₀.₈₅)₀.₉₅Pb(I₀.₈₅Br₀.₁₅)₃ and Spiro-OMeTAD (90 mM) coated Cs₀.₀₅(MA₀.₁₅FA₀.₈₅)₀.₉₅Pb(I₀.₈₅Br₀.₁₅)₃ (all at 1.4 M perovskite concentrations). The x-axis dimensions are in μm and the y-axis dimensions are in pA.
Fig. S2: Section profiles of KPFM images: Topography: (a,c,e) in dark, (b,d,f) under green light, and surface potential: (a’,c’,e’) in dark, (b’,d’,f’) under green light- maps of \((\text{MA}_{0.15}\text{FA}_{0.85})\text{Pb}(\text{I}_{0.85}\text{Br}_{0.15})_{3}\), \(\text{Cs}_{0.05}(\text{MA}_{0.15}\text{FA}_{0.85})_{0.95}\text{Pb}(\text{I}_{0.85}\text{Br}_{0.15})_{3}\) and Spiro-OMeTAD (90 mM) coated \(\text{Cs}_{0.05}(\text{MA}_{0.15}\text{FA}_{0.85})_{0.95}\text{Pb}(\text{I}_{0.85}\text{Br}_{0.15})_{3}\) (at 1.4 M perovskite concentrations). The x-axis dimensions are in \(\mu\text{m}\) and the y-axis dimensions are in mV.

Fig. S3: Topography (a) and surface potential (a’) of HOPG.
Fig. S4: Capacitance vs frequency at different illumination intensities. (a-d) 1.2M perovkites based devices varying the percentage of cesium added. (e-f) 1.4M perovkites based devices without and with 5% Cs.
Fig. S5: X-Ray diffractogram of perovskite film and with 15% Cs content after 60 minutes under UV and relative high humidity conditions (60% RH).