

The reaction equations of $C_{12}H_{25}Si(OCH_3)_3$ alcoholysis (S1) and the $\equiv SiOH$ condensation process (S2).

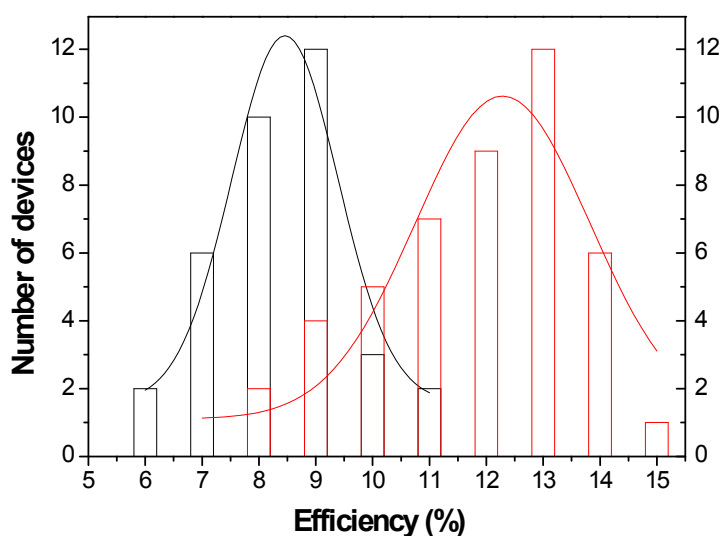
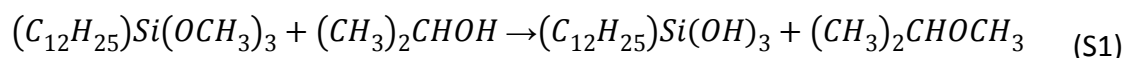


Figure S1. The efficiency distribution of the perovskite photovoltaic cells with (red bars, red fitting line) or without (dark bars, dark fitting line) C_{12} -Silane modification.

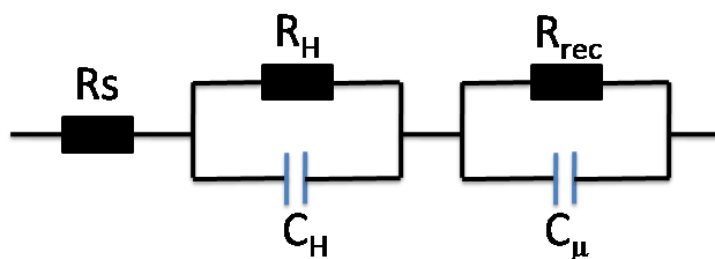


Figure S2. The equivalent circuit of the Nyquist plot. R_s represents the series resistance, One RC element (R_H , C_H) is related to the hole transport in spiro-OMeTAD, and the other one represents the recombination resistance (R_{rec}) and chemical capacitance (C_μ) on the photoanode side.

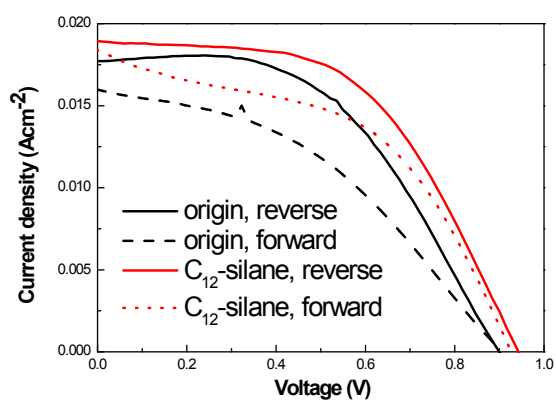


Figure S3. The hysteresis analyze of the original and 0.1M C₁₂-silane modified perovskite solar cells.