Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.


# Interfacial Engineering of Hole Transport Layer with Metal and Dielectric Nanoparticles for Efficient Perovskite Solar Cells

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# Electronic Supplementary Information

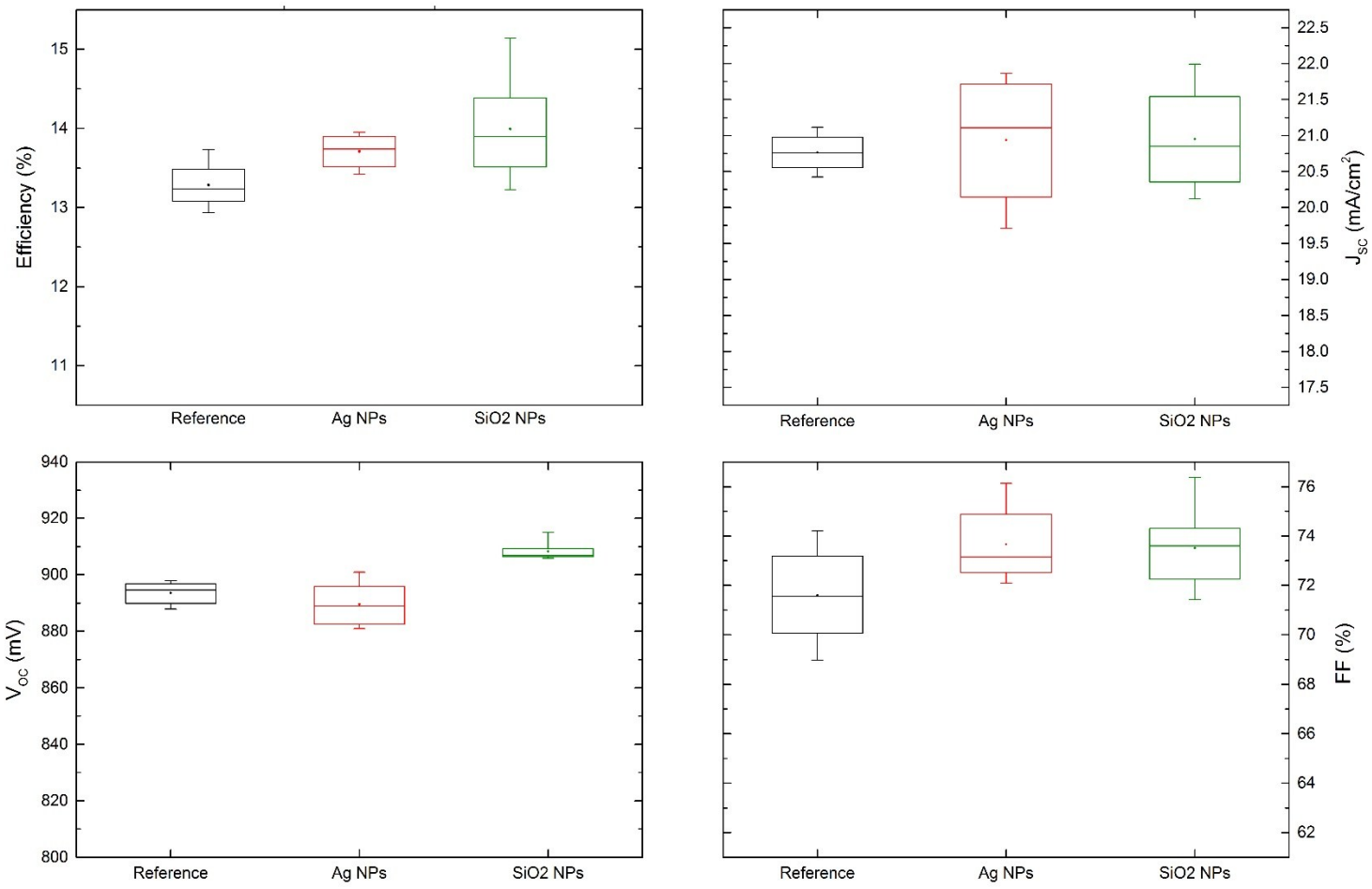


Figure S1: Box plots showing the distribution of results for device performance characteristics. The lower and upper hinge of the box represent the 25$^{th}$ and 75$^{th}$ percentiles respectively in the distribution of results. The mean result for each device category is represented by a circular dot within the box. Whiskers above and below the box indicate the maximum and minimum data points.

Table S1: The crystallite size, microstrain and dislocation density of perovskite films (from reference, Ag NPs and $SiO_2$ NPs devices) obtained from XRD spectral fitting.

| **Device** | **hkl** | **Mid Point (2θ)** | **β (deg)** | **Normalised Peak Intensity** | **Crystallite size, $d_{hkl}$ (nm)** | **Microstrain, E (x $10^{-3}$)** | **Dislocation Density, d (x $10^{11}$)** |
|---|---|---|---|---|---|---|---|
| Reference | 110 | 14.0 | 0.226 | 1827 | 37.1 | 8.00 | 0.794 |
| | 220 | 28.4 | 0.191 | 906 | 44.9 | 3.29 | 0.542 |
| | 310 | 31.8 | 0.202 | 515 | 42.6 | 3.10 | 0.600 |
| Ag NPs | 110 | 14.0 | 0.239 | 1633 | 35.1 | 8.46 | 0.887 |
| | 220 | 28.4 | 0.193 | 744 | 44.4 | 3.33 | 0.553 |
| | 310 | 31.8 | 0.191 | 512 | 45.2 | 2.92 | 0.535 |
| $SiO_2$ NPs | 110 | 14.0 | 0.233 | 1850 | 35.9 | 8.27 | 0.848 |
| | 220 | 28.4 | 0.195 | 909 | 43.8 | 3.37 | 0.568 |
| | 310 | 31.8 | 0.214 | 559 | 40.4 | 3.27 | 0.670 |