

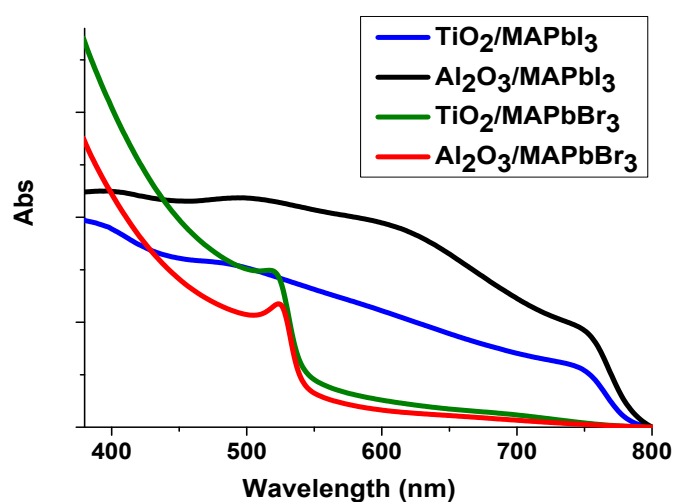
## Supporting information

### High voltage in hole conductor free organo metal halide perovskite solar cells

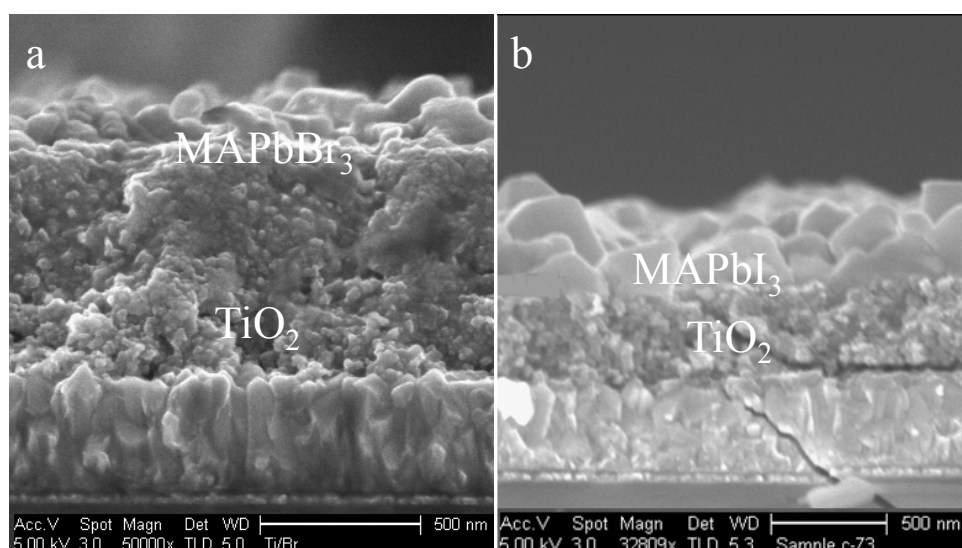
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**Figure 1S:** Absorption spectra of the four different configurations.



**Figure 2S:** HR-SEM cross section of the (a) MAPbBr<sub>3</sub>/TiO<sub>2</sub> HTM free cell and (d) MAPbI<sub>3</sub>/TiO<sub>2</sub> HTM free cell.

**List of abbreviations:**

SPV - surface photovoltage

SPS – surface photovoltage spectroscopy

CPD – contact potential difference

WF – work function

$V_{sd}$ - surface potential in the dark,

$V_{sl}$ - surface potential in light

$\eta$  – Power conversion efficiency

$V_{oc}$  – open-circuit voltage

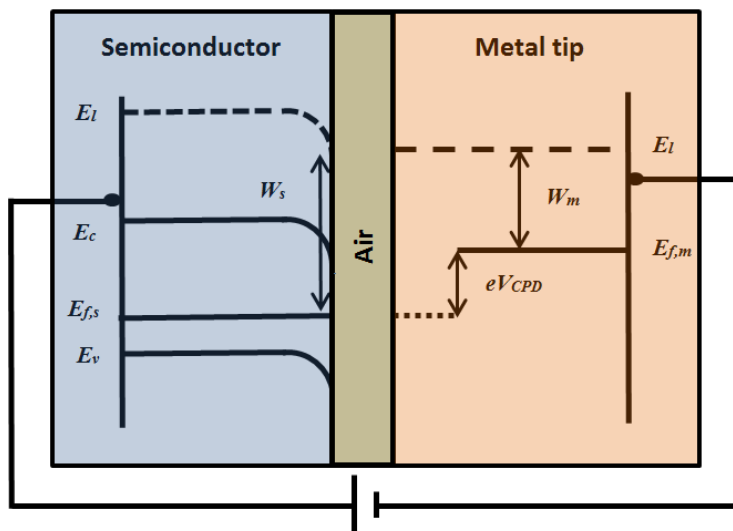
$J_{sc}$  - short-circuit photocurrent density

HTM – hole transport material

$t_{on}$  – time the light is switched on

$t_{off}$  - time the light is switched off

$\tau_r$  - recombination lifetime



**Figure 3S:** Schematic band diagram of a parallel plate capacitor formed from metal and p-type semiconductor connected through a DC bias such that the capacitor is discharged. This figure represents the tip and the semiconductor arrangement in the SPV technique.

$E_l$  - vacuum level

$E_c$  – conduction band

$E_v$  – valence band

$E_{f,s}$  – Fermi level of semiconductor

$E_{f,m}$  – Fermi level of metal

$W_s$  – Work function of semiconductor

$W_m$  – Work function of metal

$eV_{CPD}$  – Contact potential difference