Interfacial engineering of CuSCN-based perovskite solar cells via PMMA interlayer toward enhanced efficiency and stability

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Figure S1. The cross-sectional SEM image of PSCs with the configuration of FTO/SnO$_2$/MAPbI$_3$/CuSCN.

Figure S2. SEM images of perovskite thin films.

Figure S3. AFM topographical image of perovskite thin films. a) without PMMA; b) with PMMA.
Figure S4. The XPS spectra of Pb 4f core level of MAPbI$_3$ thin film.

Figure S5. FTIR spectra of PMMA and PbI$_2$/PMMA thin films.

Figure S6. Statistics on performance variations of pristine devices and PMMA modified devices (20 cells for each). a) $J_{sc}$; b) $V_{oc}$; c) FF.
Figure S7. Hysteresis of the pristine device and PMMA modified device. (Inset, photovoltaic parameters extracted from the $J-V$ curves of the champion devices measured at reverse and forward scans.)

Figure S8. Steady photocurrent of pristine device and PMMA modified device.
Figure S9. Nyquist plots of pristine device and PMMA modified device, measured under dark conditions at a bias of 0.8 V.

Table S1 Photovoltaic parameters of PSCs with or without the PMMA layer

<table>
<thead>
<tr>
<th>device</th>
<th>$J_{SC}$ (mA/cm$^2$)</th>
<th>$V_{OC}$ (V)</th>
<th>FF (%)</th>
<th>PCE (%)</th>
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<tbody>
<tr>
<td>Pristine device</td>
<td>21.74 ± 0.37</td>
<td>1.017 ±</td>
<td>0.709 ± 0.01</td>
<td>15.69 ± 0.43</td>
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<tr>
<td>PMMA modified device</td>
<td>22.27 ± 0.29</td>
<td>1.091 ±</td>
<td>0.760 ± 0.01</td>
<td>18.53 ± 0.43</td>
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</tbody>
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