Supporting Information for

Post-Healing of Defects: Alternative Way for Passivation of Carbon-Based Mesoscopic Perovskite Solar Cells via Hydrophobic Ligand Coordination

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Fig. S1 Adsorption position of ligands in different device structures.

Fig. S2 Digital images of the triple-layer scaffold at different stages.
Fig. S3 The PCE changes of fully printable carbon-based MPSCs with varying TOPO precursor concentration. The average PCE is collected from 10 different test points. The mM represents $10^{-3}$ mmol/mL.

Fig. S4 XPS of pristine and TOPO post-treated MAPbI$_3$ film.
**Fig. S5** XPS results of C 1s (a), N 1s (b), I 3d (c), Pb 4f (d), O 1s (e) and P 2p (f) for pristine and TOPO post-treated MAPbI$_3$ film.

**Fig. S6** Nyquist plots of devices with/without TOPO post-treatment and the equivalent circuit employed to fit the EIS spectra. The fitting results are showed in Table S1.
**Fig. S7** $V_{oc}$ of devices with/without TOPO post-treatment plotted against light intensity on a logarithmic scale.

![Graph showing normalized $V_{oc}$ vs. light intensity](image)

**Fig. S8** X-Ray Diffraction (XRD) of pristine and post-treated TOPO perovskite film.

![XRD spectra](image)
Fig. S9 Time-resolved photoluminescence (TRPL) of pristine and TOPO post-treated MAPbI$_3$ film deposited on TiO$_2$.

Fig. S10 Atomic force microscope (AFM) images of pristine and TOPO post-treated perovskite film.
**Fig. S11** The solubility of chlorobenzene to perovskite film at different TOPO amount. The TOPO concentration used for the MPSCs is 0.001mmol/ml. The area of perovskite film in bottle is equal to the MPSCs (0.64 cm²).

![Image of solubility](image.png)

**Table. S1** The fitting results of EIS in Fig S6.

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<th>Rs (Ω)</th>
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<th>CPEtr-P</th>
<th>Rrec(Ω)</th>
<th>CPErec-T</th>
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<td>Pristine</td>
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<td>175.4</td>
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**Table. S2** The fitting results of TRPL in Fig S9.

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