Electronic Supplemental Information for

**Hydrogen Plasma–Treated MoSe₂ Nanosheets Enhance the Efficiency and Stability of Organic Photovoltaics**


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Fig. S1. $J-I^2$ characteristics of devices, allowing calculations of the (a) hole and (b) electron mobilities using the Mott–Gurney equation.

Fig. S2. AFM topographic images (5 × 5 µm) of blend films: (a) PTB7-TH:PC$_{71}$BM:10%MoSe$_2$, (b) PTB7-TH:PC$_{71}$BM:20%MoSe$_2$. 

PC$_{71}$BM:10%MoSe$_2$, (b) PTB7-TH:PC$_{71}$BM:20%MoSe$_2$. 
Fig. S3. Corresponding 1D GIWAXS profiles reduced from the (a) in-plane and (b) out-plane directions.

Fig. S4. Powder X-ray diffraction pattern of the films.
Fig. S5. TEM images of active layers incorporating (a) MoSe$_2$ and (b) hydrogen plasma–treated MoSe$_2$.

Fig. S6. J–V characteristics incorporating MoSe$_2$ prepared with different concentration.
Table S1 Different concentration of ternary blends devices’ photovoltaic performances.

<table>
<thead>
<tr>
<th>Active layer</th>
<th>$V_{oc} (V)$</th>
<th>$J_{sc} (mA cm^{-2})$</th>
<th>FF(%)</th>
<th>PCE$_{max}$(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTB7-TH:PC$_{71}$BM:10% MoSe$_2$</td>
<td>0.78 ± 0.01</td>
<td>17.23 ± 0.2</td>
<td>0.7 ± 0.2</td>
<td>9.32</td>
</tr>
<tr>
<td>PTB7-TH:TH:PC$_{71}$BM:20% MoSe$_2$</td>
<td>0.78 ± 0.01</td>
<td>17.6 ± 0.3</td>
<td>0.67 ± 0.3</td>
<td>9.26</td>
</tr>
</tbody>
</table>

a) Weight ratio of D:A = 1:1.5  Twenty devices were fabricated.

Fig. S7. SEM image of MoSe$_2$.

Fig. S8. Schematic representation of the chemical structures of (a) PBDTTBO, and (b) IT-4F.