

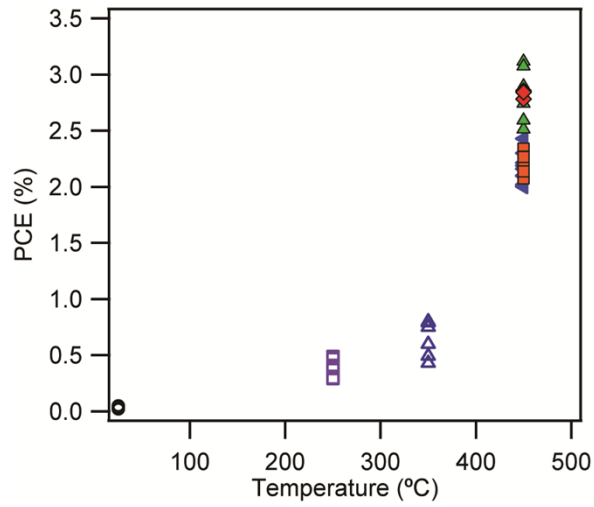
Supplementary Information

Organic Photovoltaic Cells Utilizing ZnO Electron Extraction Layers Produced Through Thermal Conversion of ZnSe.

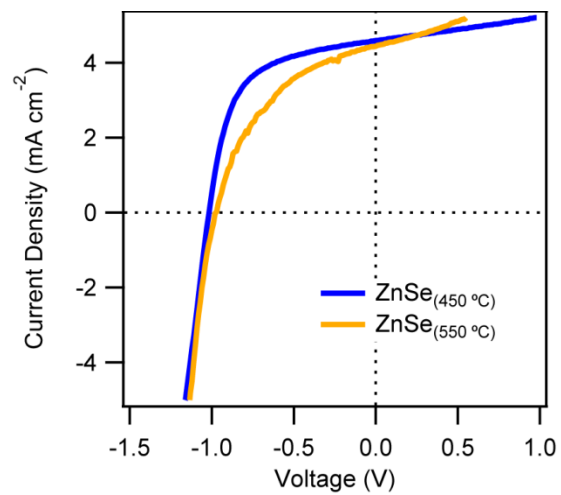
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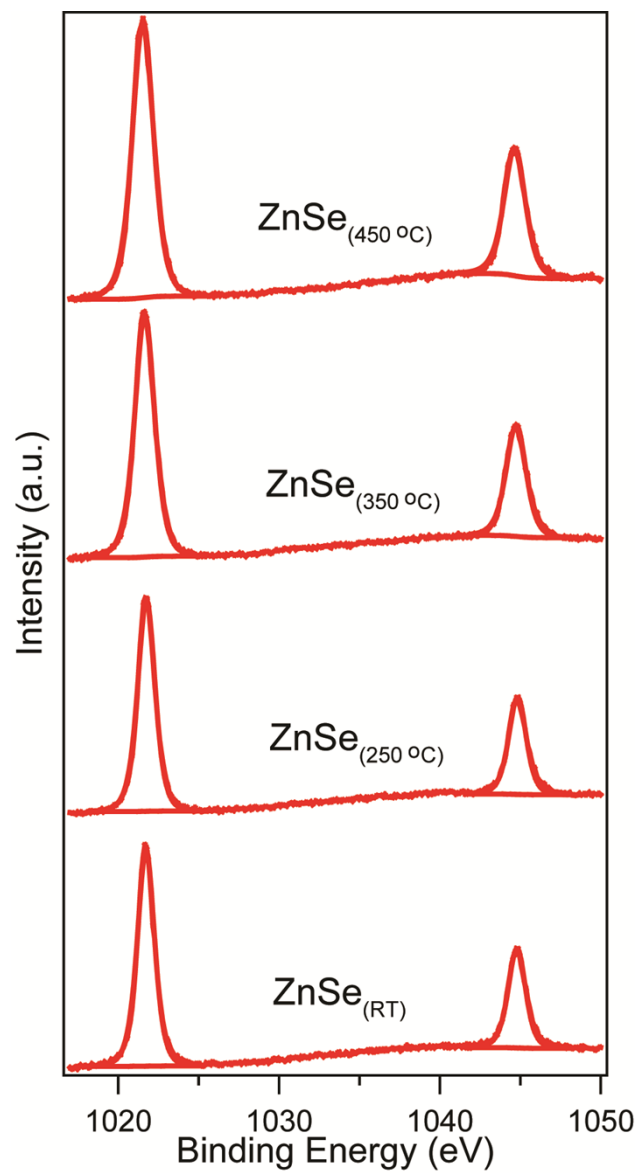
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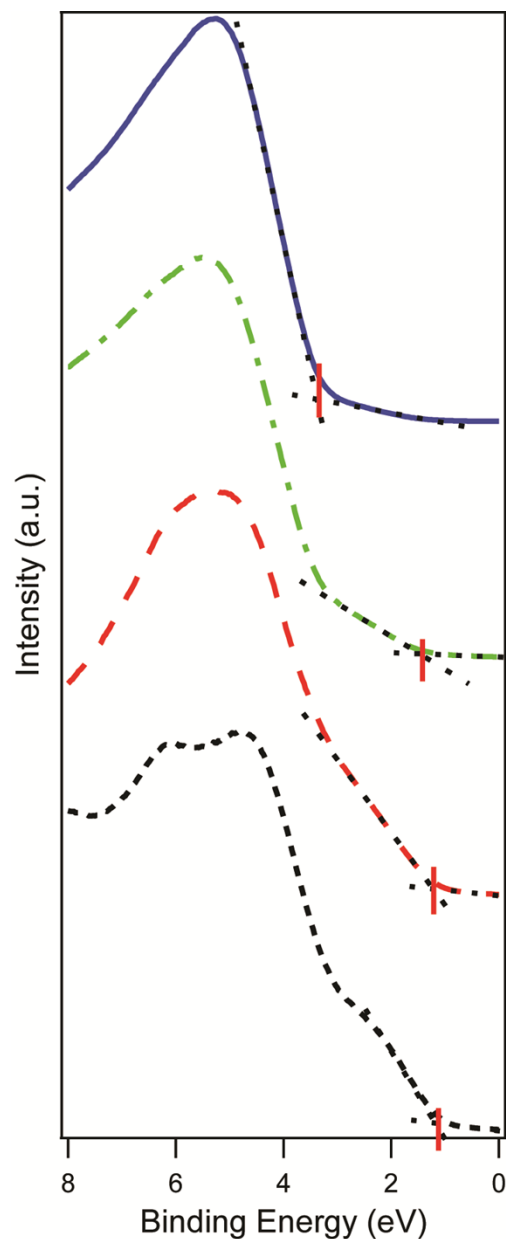
S1: Batch-to-batch and within batch variation of cell efficiency for devices with ZnSe layers annealed at 450 °C. Variation within the dataset included in Table 1 is shown for other temperatures.



S2: *J-V* characteristic plots for the C₆₀ / SubPc cells with ZnSe layers annealed at 450 °C and 550 °C.



S3: XPS spectra of the Zn 2p region obtained for each layer treatment used to calculate layer compositions shown in Table 2 in main text.



S4: Valence band UPS spectra for 8nm $\text{ZnSe}_{(\text{RT})}$ films (black dashed lines), $\text{ZnSe}_{(250\text{ }^\circ\text{C})}$ films (red dashed lines), $\text{ZnSe}_{(350\text{ }^\circ\text{C})}$ films (green dashed dot lines) and 8 nm $\text{ZnSe}_{(450\text{ }^\circ\text{C})}$ films (blue solid lines), both deposited onto ITO substrates. Solid red and dashed black lines show fitting of the data.

The valence band UPS spectra shown in S4 indicate a shift in the onset of the valence band with increasing heat treatment. The $\text{ZnSe}_{(\text{RT})}$ films have an onset 1.1 eV below the Fermi level. This onset is shifted marginally to 1.2 eV for $\text{ZnSe}_{(250\text{ }^\circ\text{C})}$ films and to 1.4 eV for $\text{ZnSe}_{(350\text{ }^\circ\text{C})}$ layers. The $\text{ZnSe}_{(250\text{ }^\circ\text{C})}$ layers, fully converted to ZnO (see Figures 3,4 main text), have a large shift in valence band onset to 3.3 eV. The $\text{ZnSe}_{(\text{RT})}$ and $\text{ZnSe}_{(250\text{ }^\circ\text{C})}$ samples have a prominent feature from the onset of the valence band to ~ 3 eV. This is still present in the $\text{ZnSe}_{(350\text{ }^\circ\text{C})}$ films, but is significantly reduced in intensity. This is likely to be due to the partial conversion of the film to

ZnO that is described in the main text. This feature is not present for the ZnSe_(450 °C) sample, indicating that it is due to the ZnSe content of the other layers.