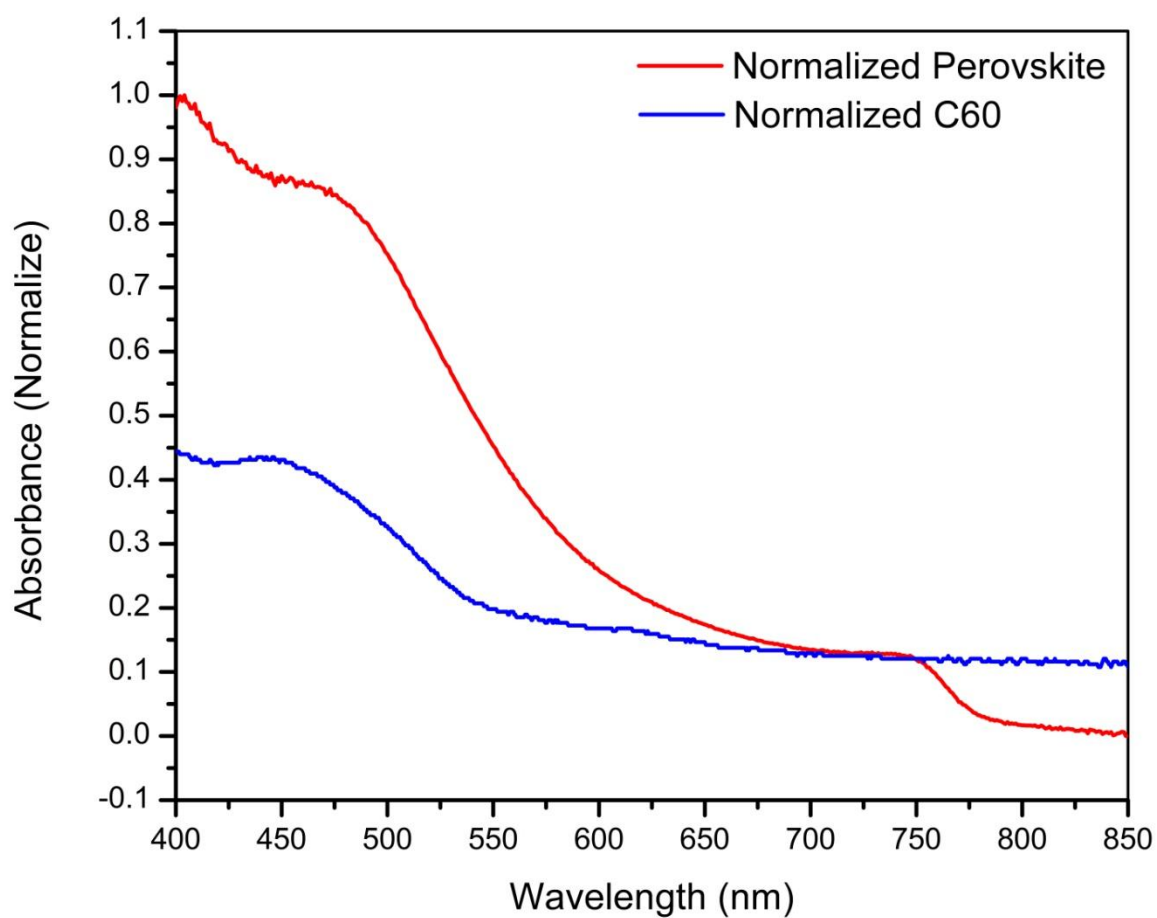
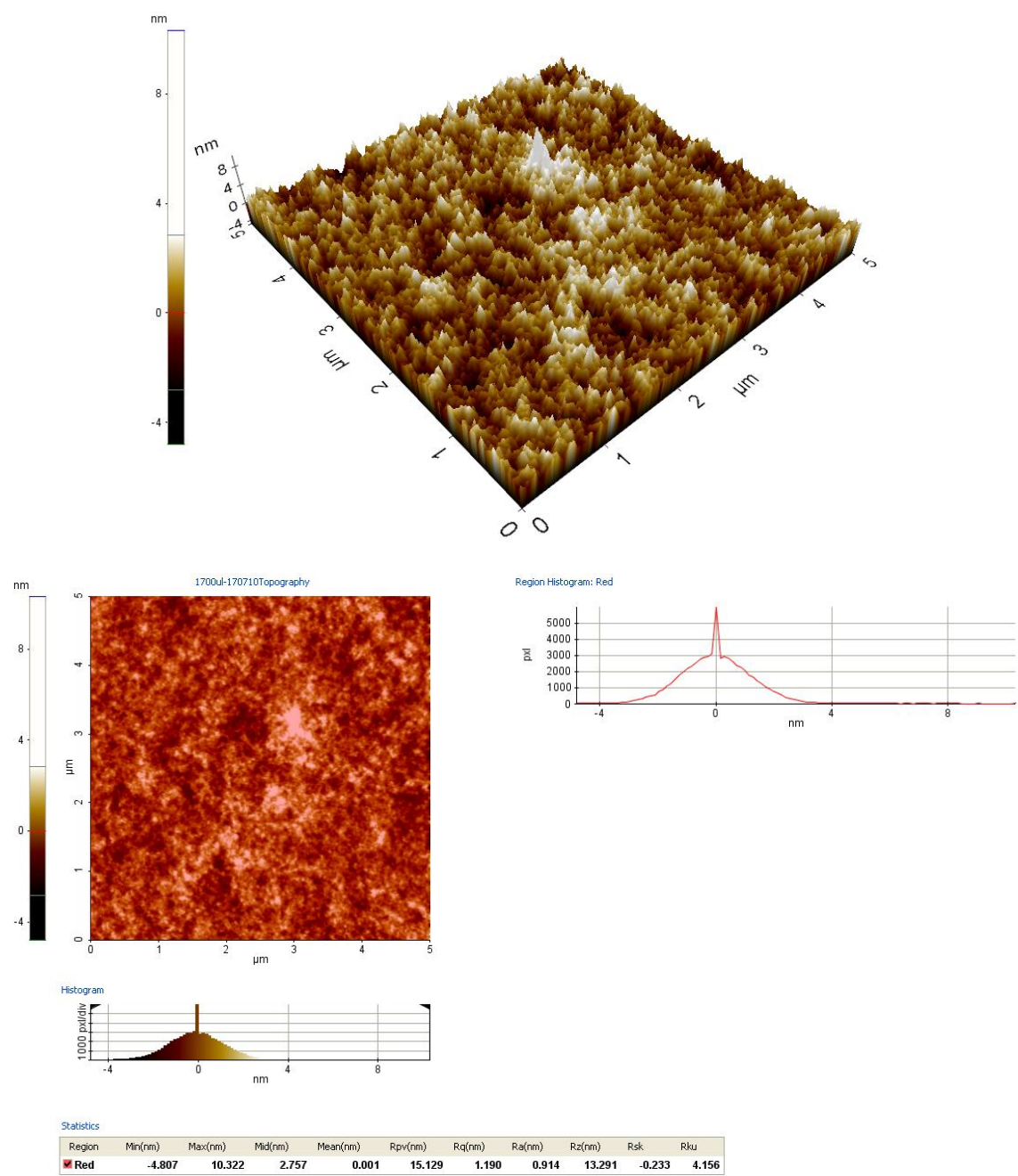


Supplementary Material



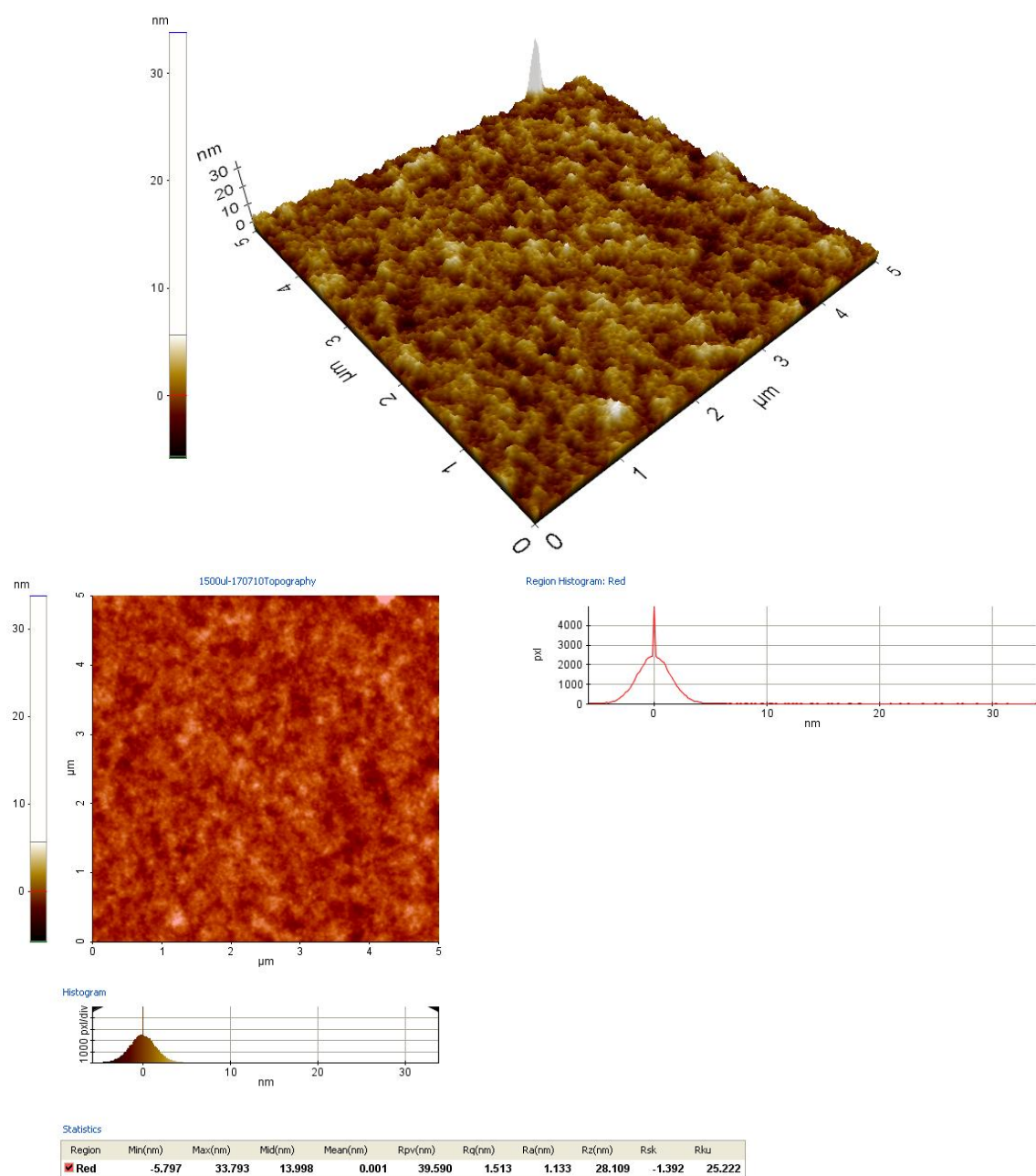
Supplementary Figure 1. The normalized absorbance spectrum of active layer, the perovskite material (red curve) and fullerene material (C₆₀, blue curve), in the inverted perovskite solar cells from 400-850 nm.

Supplementary Material



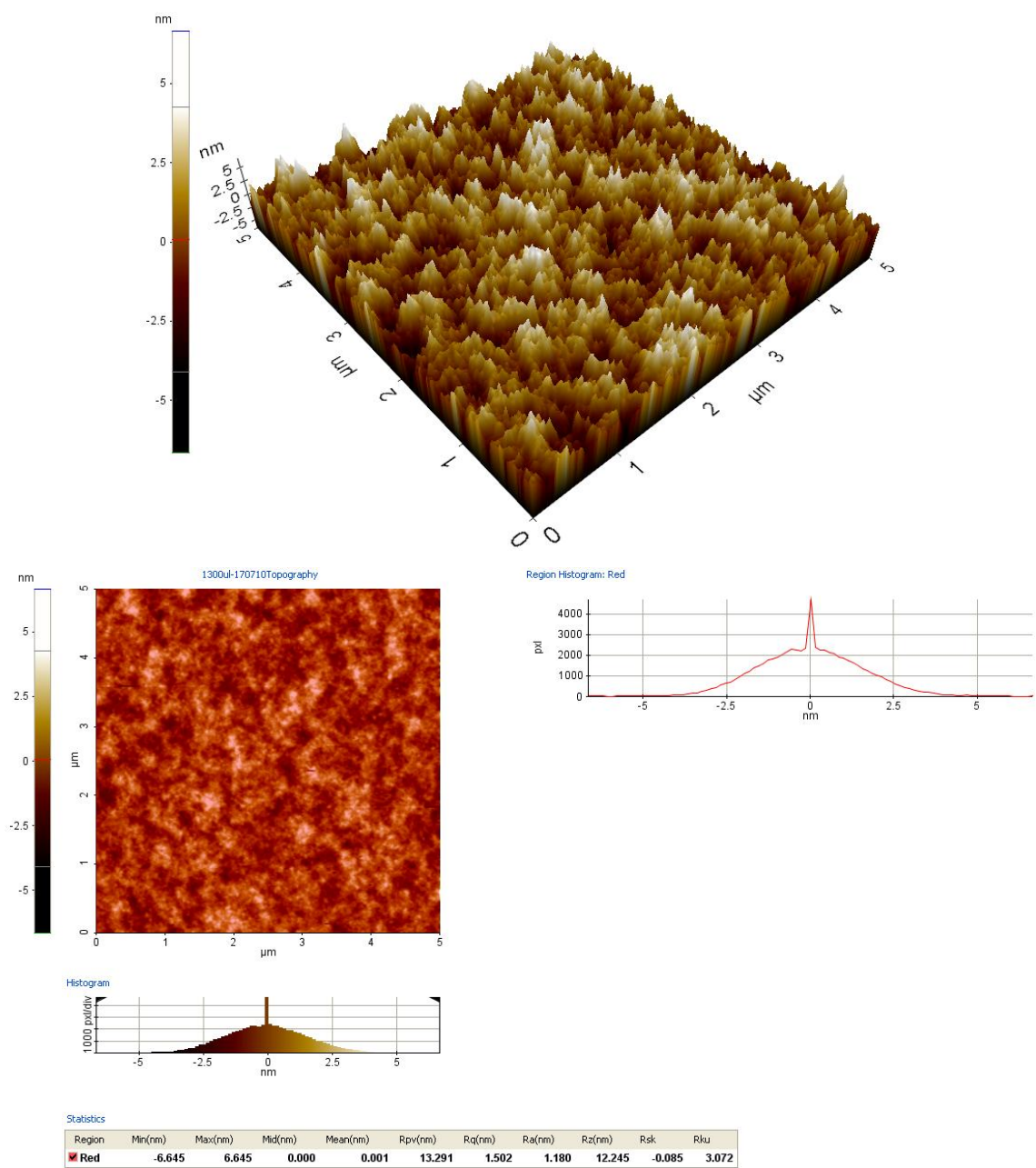
Supplementary Figure 2(a). The AFM measurement result for the PSCs with specific tilt angle (X-Y-Z of -40° - 30° - 30°) and scan area ($5 \times 5 \mu\text{m}$), which is fabricated through improved PEDOT:PSS solution of 1700 μl as HTL.

Supplementary Material



Supplementary Figure 2(b). The AFM measurement result for the PSCs with specific tilt angle (X-Y-Z of -40°- 30°- 30°) and scan area (5 × 5 μm), which is fabricated through improved PEDOT:PSS solution of 1500 μl as HTL.

Supplementary Material



Supplementary Figure 2(c). The AFM measurement result for the PSCs with specific tilt angle (X-Y-Z of -40° - 30° - 30°) and scan area ($5 \times 5 \mu\text{m}$), which is fabricated through improved PEDOT:PSS solution of $1300 \mu\text{l}$ as HTL.