Electronic Supplementary Information

Understanding of Morphology Evolution in Local Aggregates and Neighboring Regions for Organic Photovoltaics

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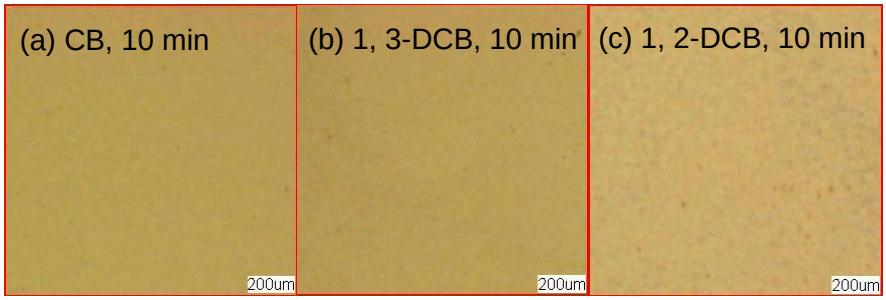

Figure S1. Optical images (200 μm × 200 μm) of pure P3HT films from (a) CB, (b) 1, 3-DCB and (c) 1, 2-DCB after thermal annealing (140 °C, 10 min).

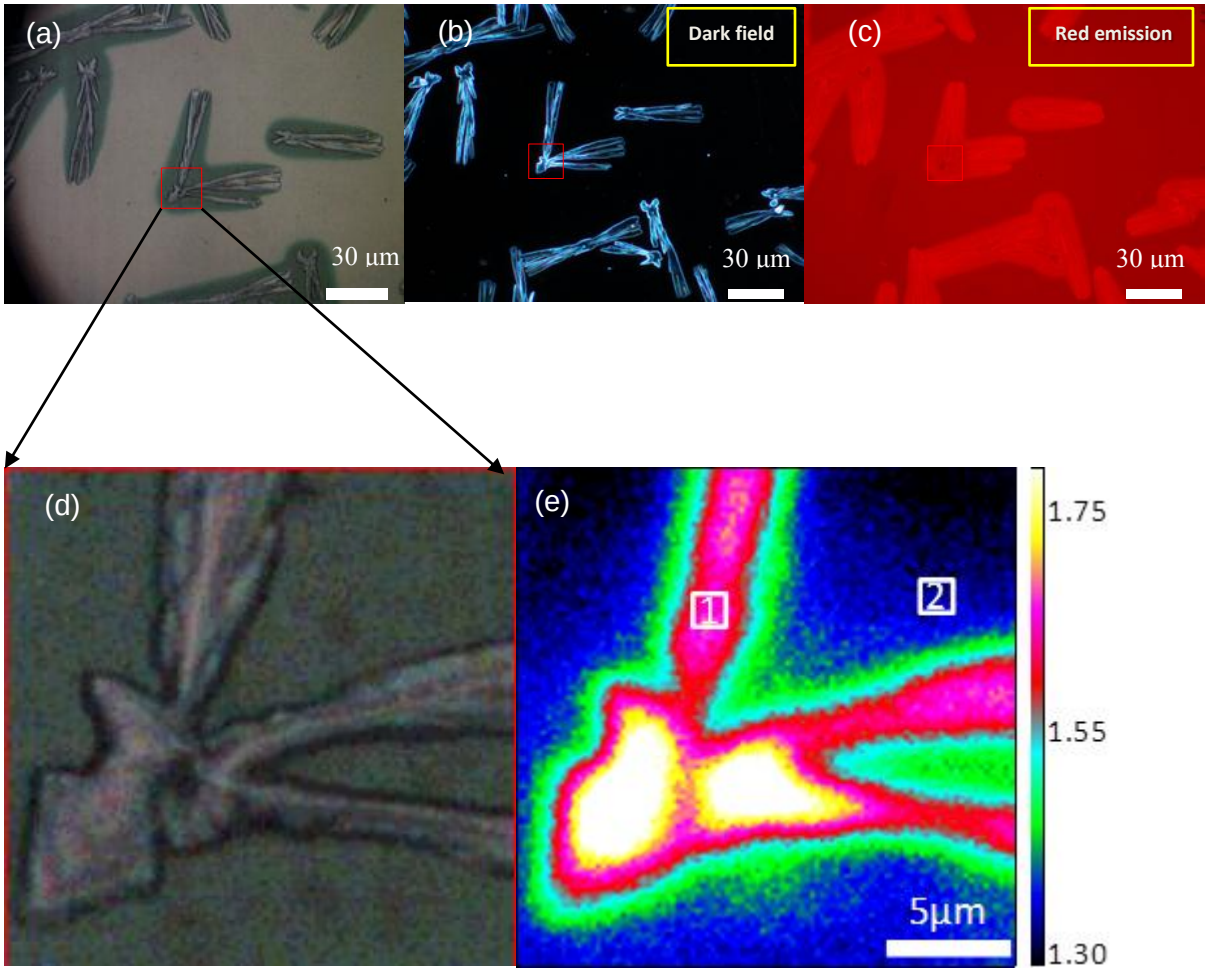

Figure S2. Images of the thermally annealed (140 ℃, 20 min) P3HT/PCBM blend film from CB: (a) optical image, (b) dark field image, (c) red emission image with green light excitation, (d) optical image (20 μm × 20 μm) of a selected location in the film, and (e) fluorescence intensity ratio (720 nm/650 nm) mapping (excitation: 532 nm) of the location. Region 1 was on PCBM-rich aggregate area while region 2 was a PCBM-deficient area. The dark field images were captured with 60 ms exposure time on a Nikon Eclipse LV150 microscope equipped with high-intensity 12V-50W halogen light source, using a 50× objective.

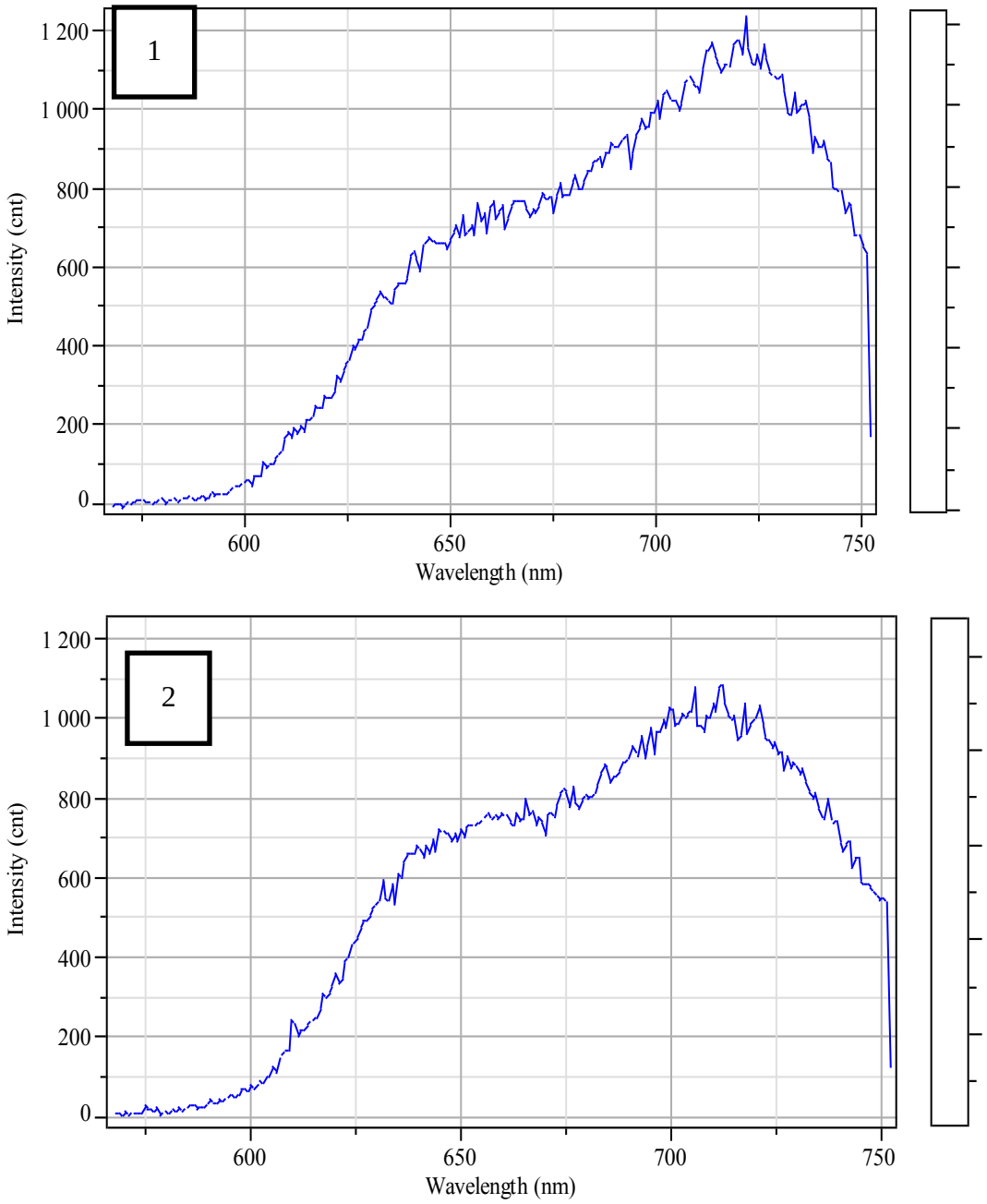

Figure S3. Fluorescence spectra (excitation: 532 nm) of locations (regions 1 and 2 shown in Figure S2e) in the thermally annealed (140 ℃, 20 min) P3HT/PCBM blend film from CB.

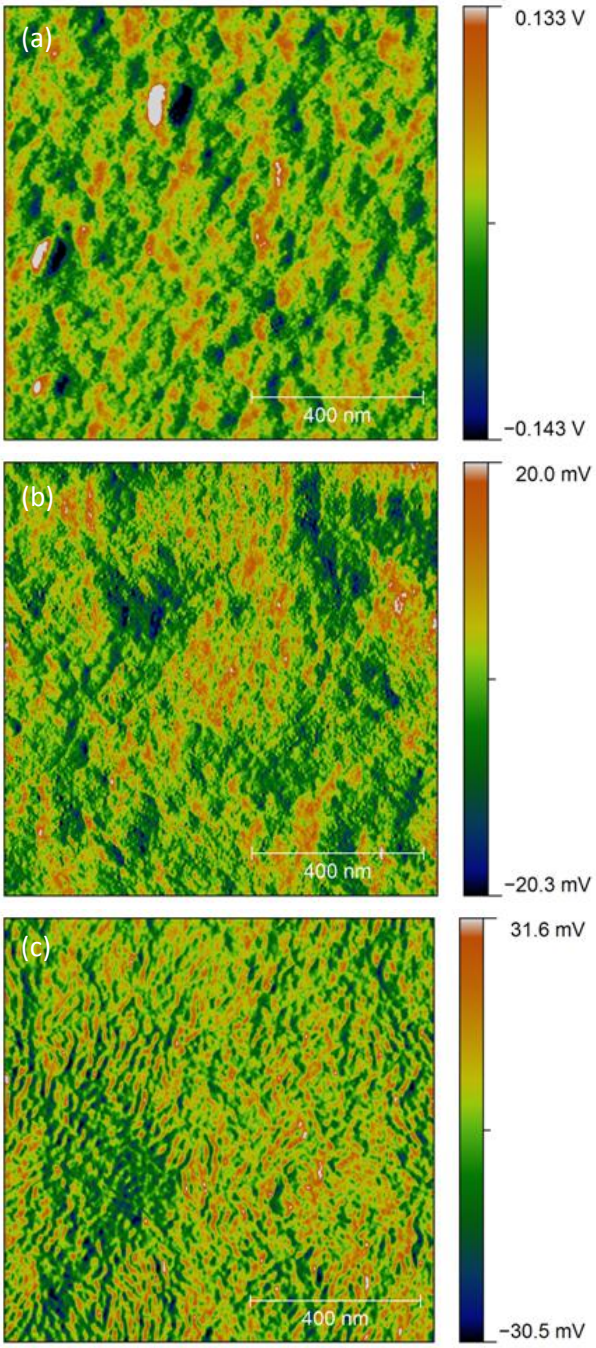

Figure S4. AFM amplitude images (1 μm × 1 μm, scale bar: 400 nm) at region 3 of thermally annealed (140 ℃, 10 min) P3HT/PCBM blend films from (a) CB, (b) 1, 3-DCB, and (c) 1, 2-DCB.

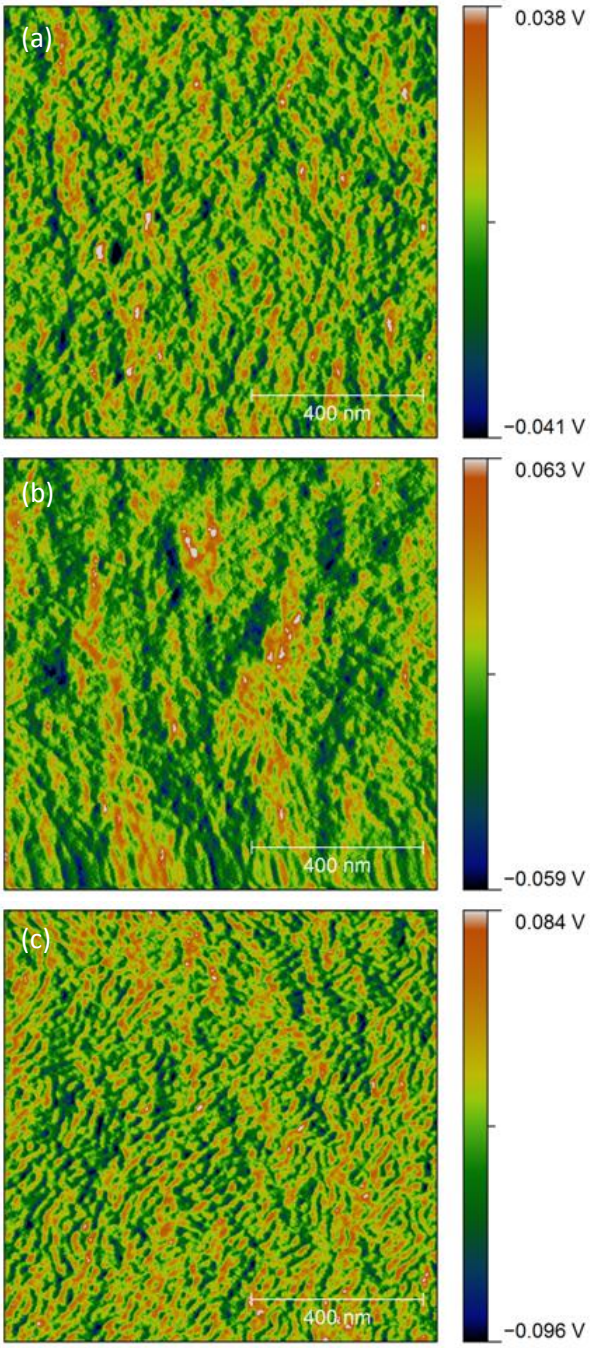

Figure S5. AFM amplitude images (1 $\mu m \times 1\ \mu m$, scale bar: 400 nm) at region 2 of thermally annealed (140 ℃, 10 min) P3HT/PCBM blend films from (a) CB, (b) 1, 3-DCB, and (c) 1, 2-DCB.

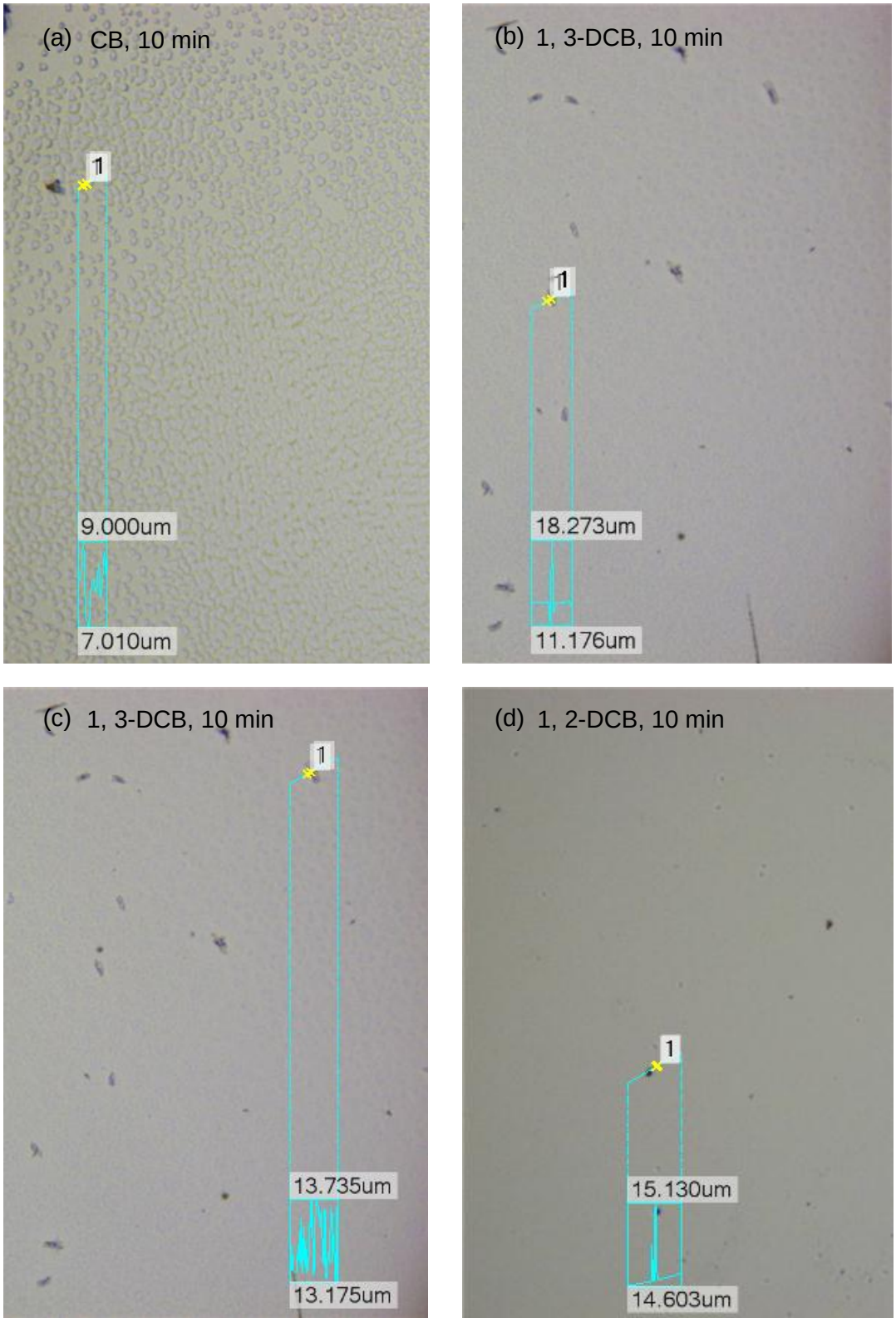

Figure S6. Optical images (~525 μm × ~350 μm) with relatively vertical dimensions of aggregates in active layers (with top electrodes, thermally annealed at 140 ℃ for 10 min) from (a) CB, (b, c) 1, 3-DCB and (d) 1, 2-DCB. Aggregates' absolute vertical dimensions can be estimated by gaps of relatively vertical dimensions.

Figure S7. Photo of thermally annealed (140 ℃, 20 min) P3HT/PCBM blend films from (a) CB, (b) 1, 3-DCB, and (c) 1, 2-DCB.