

Supporting Information

Identifying Effects of TiO₂ Nanowires inside Bulk Heterojunction Organic Photovoltaics on Charge Diffusion and Recombination

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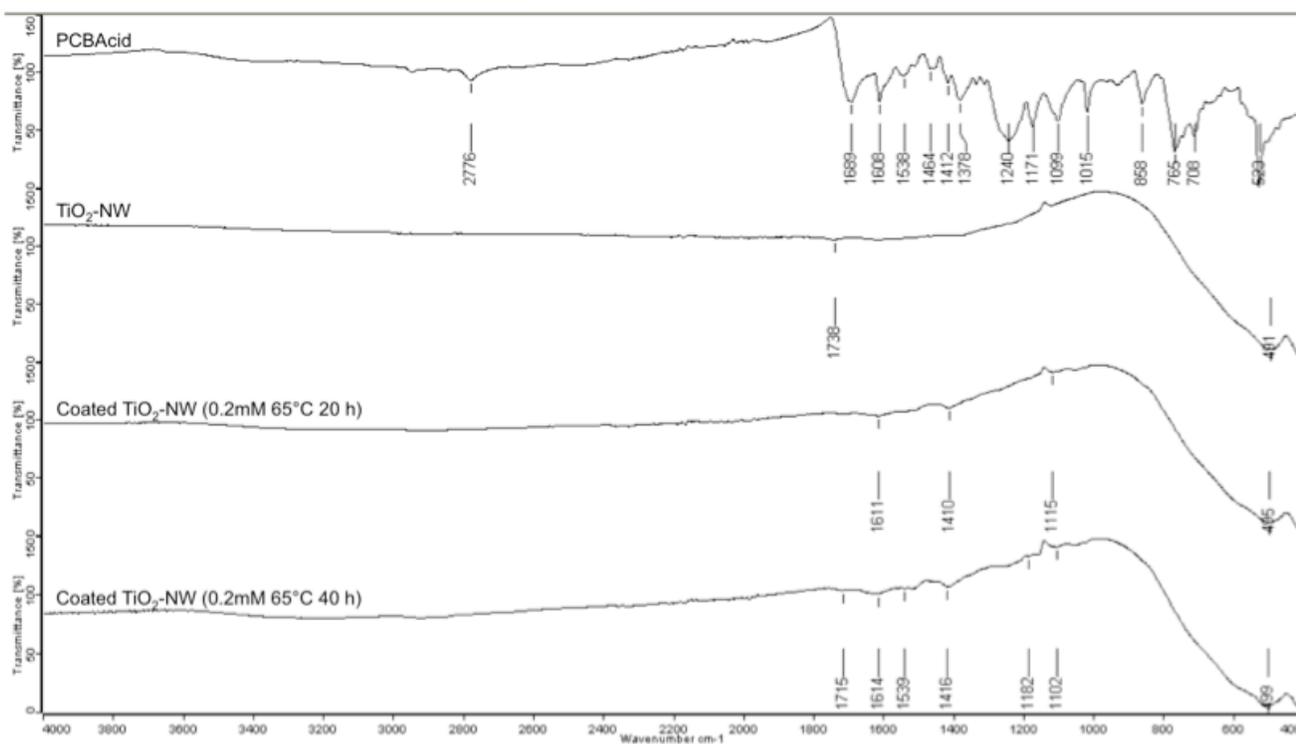


Figure S1 FTIR spectrum of PCBAcid, TiO₂-NW and TiO₂-NW after coating.

In the FTIR spectrum of PCBAcid, the double peaks at 708 and 765 cm⁻¹ correspond to the C-H bonds, the peaks at 1608 and 1099 cm⁻¹ are from C=O and C-O bonds on the side chain, respectively, and the C₆₀ in the PCBAcid has two peaks in the FTIR spectrum at 520 and 1378 cm⁻¹.^{1,2} Conversely, the TiO₂-NW exhibits only one broad band from 900 to 450 cm⁻¹ with a peak position at 491 cm⁻¹. After 20 h coating, a slight shift in peak position from 491 cm⁻¹ to 495 cm⁻¹ was observed and two new peaks were found at 1611 and 1410 cm⁻¹. With longer coating (40 h), these peaks were further shifted, and several new peaks appeared at 1102 cm⁻¹. Surface modification causes the shift in the main peak of TiO₂-NW from 491 to 499 cm⁻¹, as well as the new peak at 1416 cm⁻¹. The new peaks at 1614 and 1102 cm⁻¹ on the coated TiO₂-NW are from C=O and C-O in the carboxylic acid connecting the C₆₀ and TiO₂-NW. The slight shifting of the peaks from these two bonds indicates formation of new bonds in adjacent atoms. Therefore, the FTIR spectrum shows that a self-assembled monolayer from PCBAcid was formed on the surface of TiO₂-NW.

Reference

1. S. H. Yoo, J. M. Kum, and S. O. Cho, *Nanoscale Res. Lett.*, 2011, **6**, 1–7.
2. Y. Gao, X. Pu, D. Zhang, G. Ding, X. Shao, and J. Ma, *Carbon*, 2012, **50**, 4093–4101.