Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics

Supplementary Information

Effects of Morphology of Nanostructured ZnO and Interface Modification on Device Configuration and Charge Transport of ZnO/Polymer Hybrid Solar Cells

Pipat Ruankham, Susumu Yoshikawa, and Takashi Sagawa[*]

[*] *E-mail: sagawa.takashi.6n@kyoto-u.ac.jp, Tel: +81-75-753-5624*

Contents

1. AFM image of ZnO nanoparticles thin film

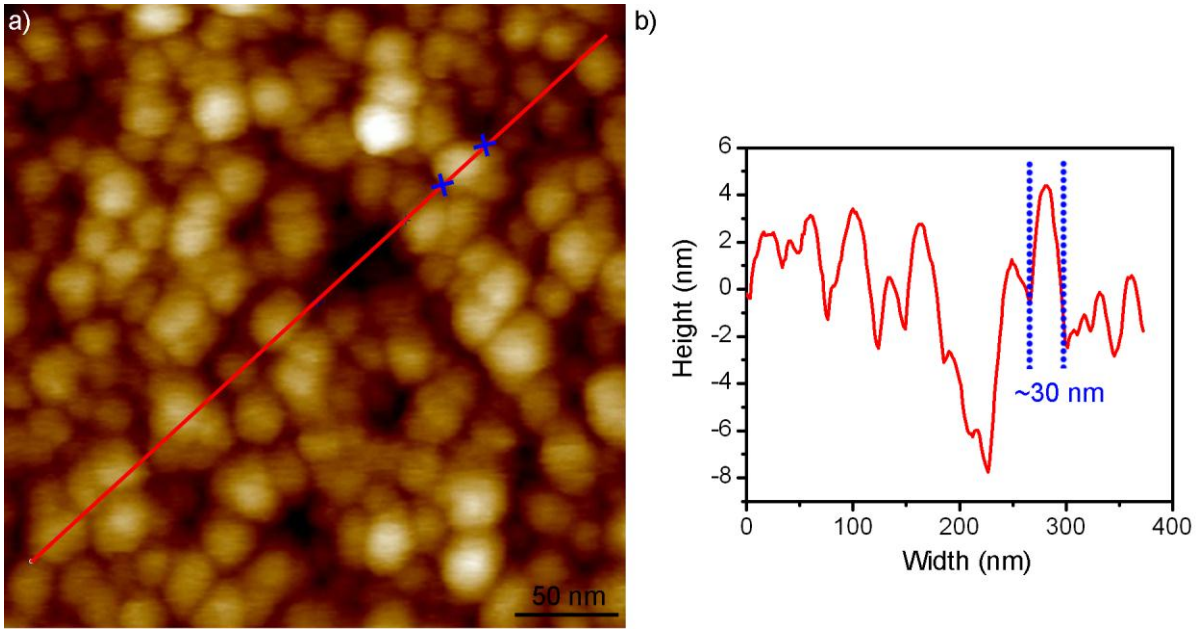

Figure S1. a) AFM image of ZnO nanopartilces thin film on an ITO substrate and b) cross section determined along the red line in the image.

2. EDS point analysis

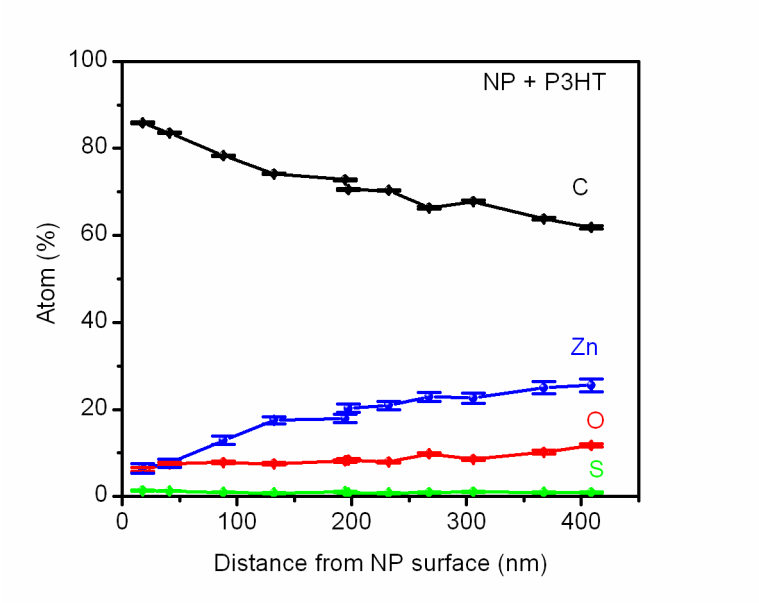

Figure S2. Relative atomic percentage of NPs coated with P3HT.

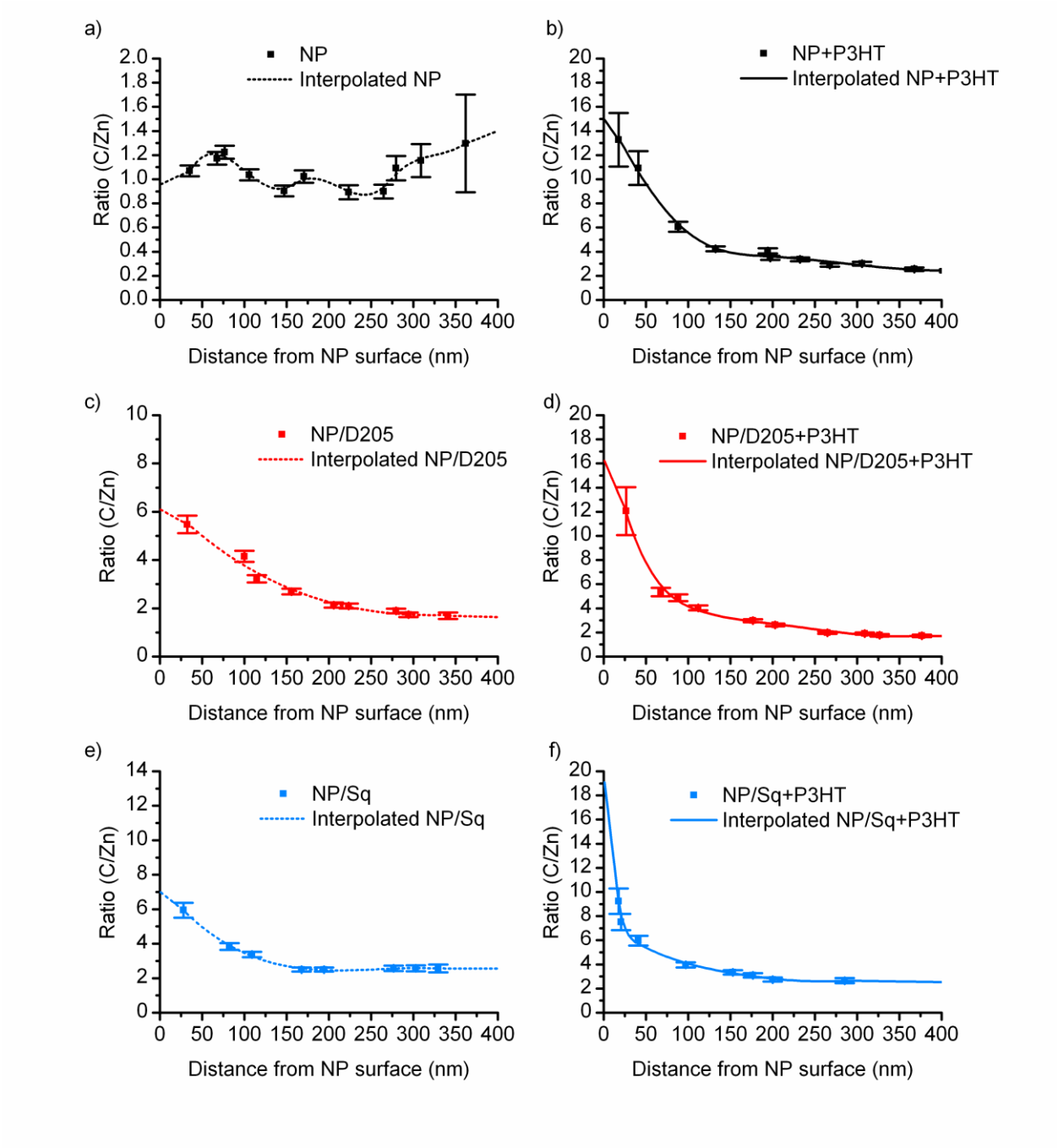

Figure S3. Experimental and interpolated C/Zn ratio of NPs with and without the surface modification before a), c), e) and after b), d), f) the P3HT deposition.

3. Optimization of NR-length and NP-thickness

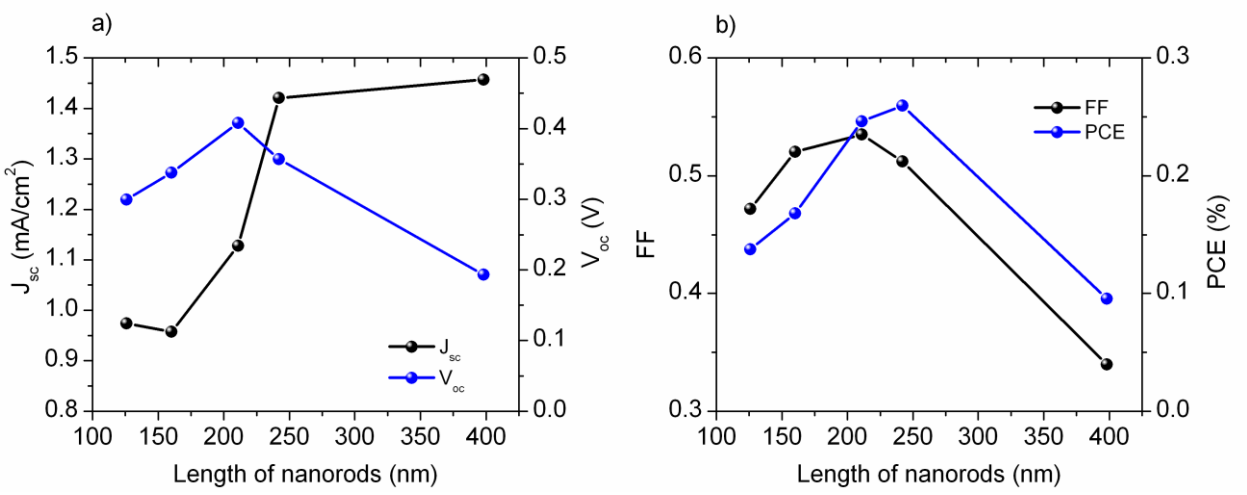

Figure S4. Photovoltaic parameters of a) J_{sc} and V_{oc}, b) *FF* and *PCE* for the ZnO NR devices without surface *modification* at various lengths of the nanorods.

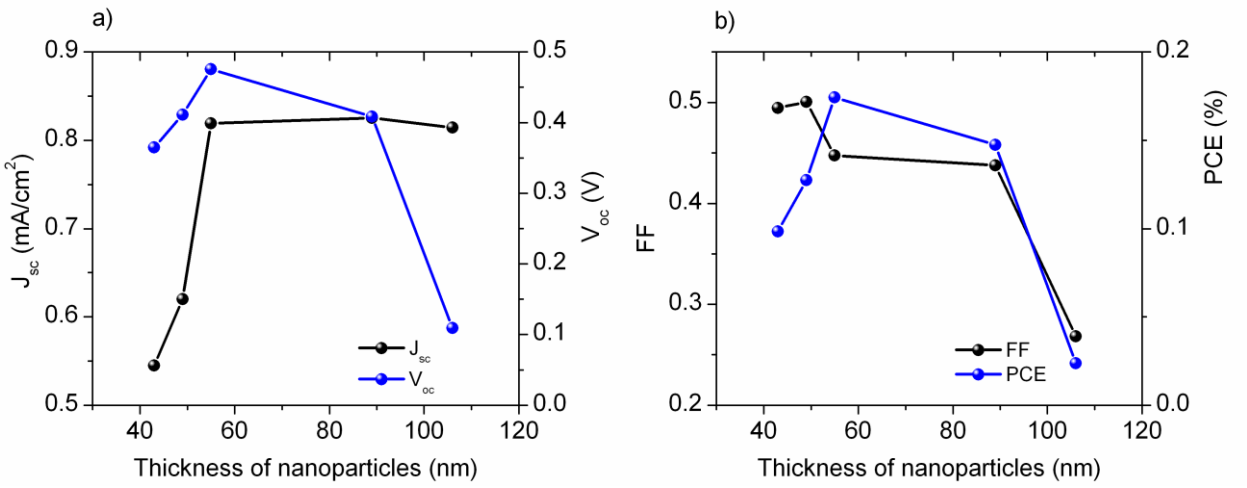

Figure S5. Photovoltaic parameters of a) J_{sc} and V_{oc}, b) *FF* and *PCE* for the ZnO NP devices without surface modification at various thicknesses of the nanoparticles.

4. Electronic band structure

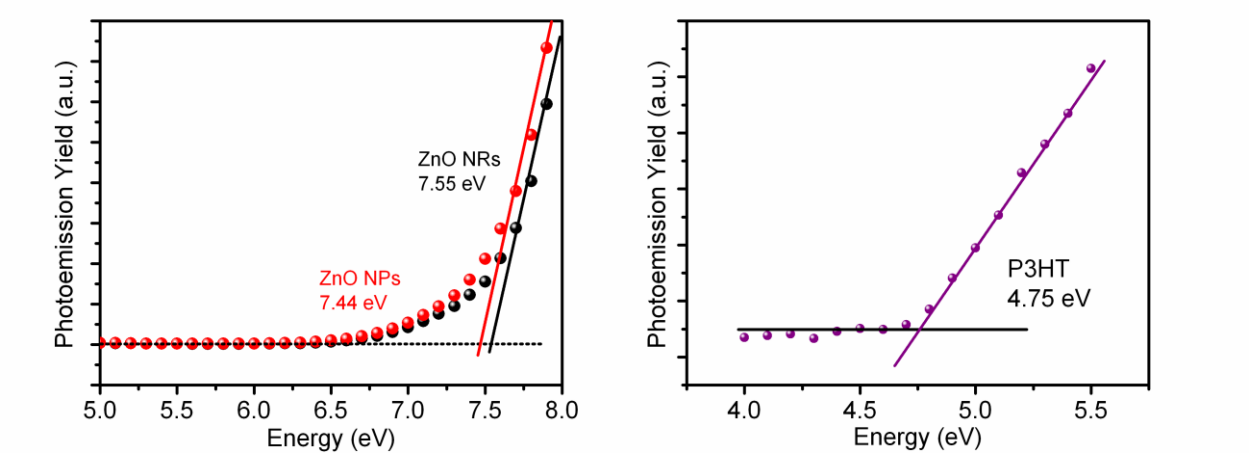

Figure S6. Valence band edge measurement of ZnO NRs, ZnO NPs, and P3HT by photoemission yield spectroscopy.

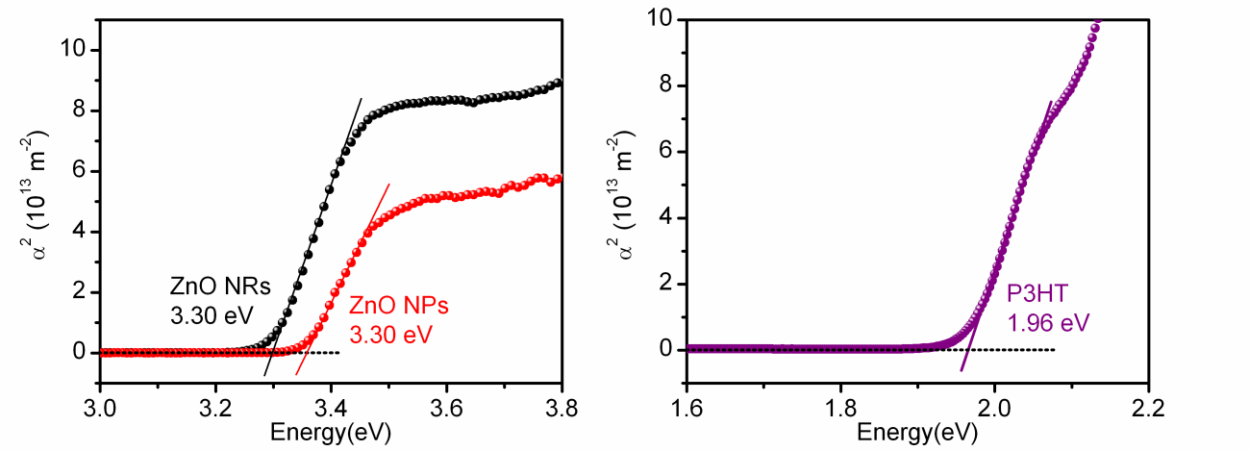

Figure S7. The plot of absorption coefficient (σ) versus photon energy for ZnO NR, ZnO NP, and P3HT films on glass substrates. The open symbol and solid line denote the experimental data and fitted curve.[1]

5. Reference

(1) Ruankham, P.; Sagawa, T.; Sakaguchi, H.; Yoshikawa, S. *J Mater Chem* **2011**, *21*, 9710.