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Supporting Information

One-pot Synthesis of Hierarchical Mesoporous SnO_2 Spheres Using Graft Copolymer: Enhanced Photovoltaic and Photocatalytic Performance

Jung Tae Park,[a,b] Chang Soo Lee,[a] Jong Hak Kim[a,*]

[a] *Department of Chemical and Biomolecular Engineering, Yonsei University, 262 Seongsanno, Seodaemun-gu, Seoul 120-749, South Korea*

[b] *Department of Chemical Engineering, Massachusetts Institute of Technology, 77 Massachusetts Ave., 66-325, Cambridge, MA, 02139, USA*

[*] To whom correspondence should be addressed

Tel: +82-2-2123-5757, Fax: +82-2-312-6401

E-mail: jonghak@yonsei.ac.kr

Fig. S1. (a) Plan-view SEM images of the multi-functional om-SnO_2 IF layer and (b) cross-sectional SEM image of the multi-functional om-SnO_2 IF layer coated on FTO glass.

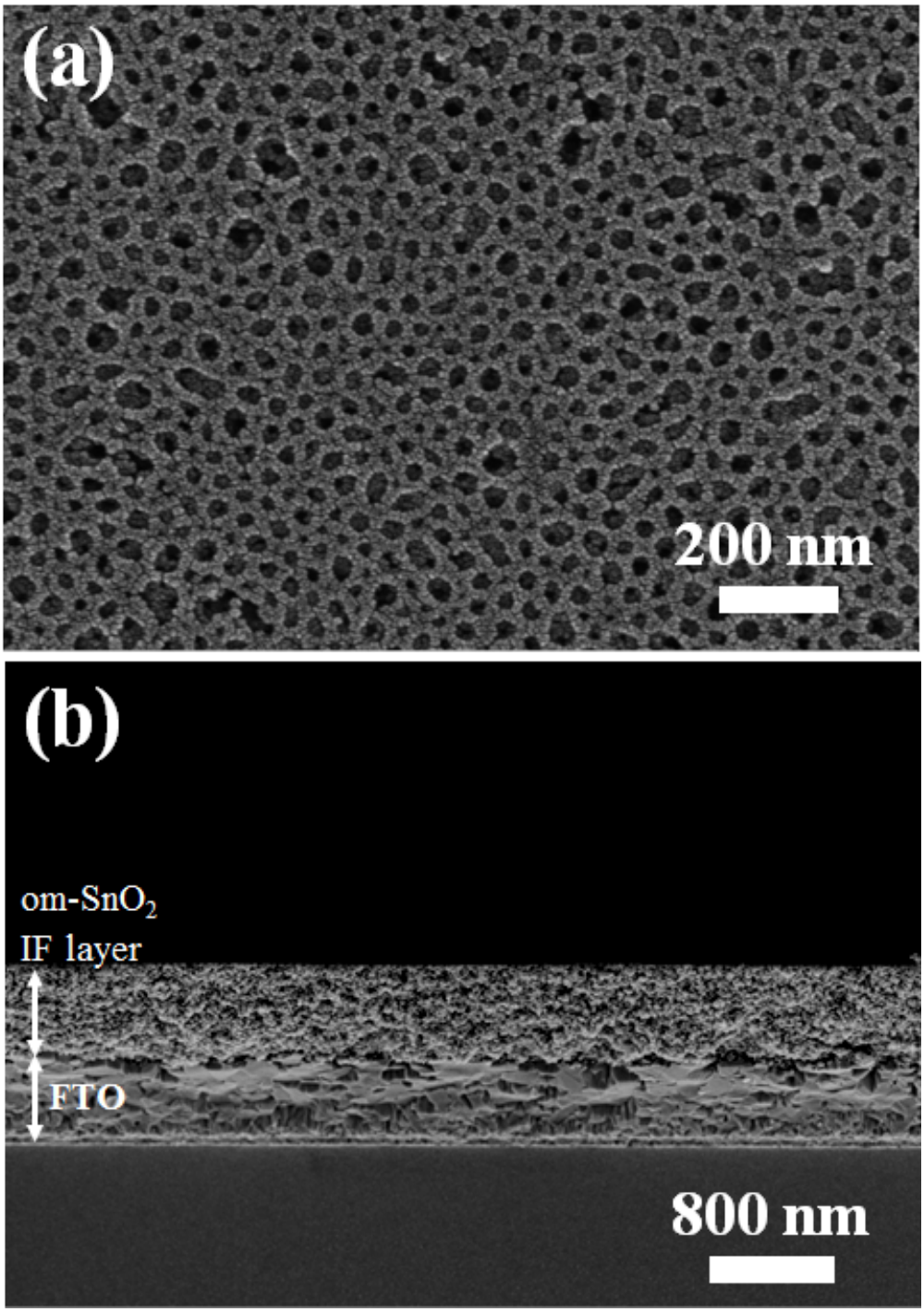
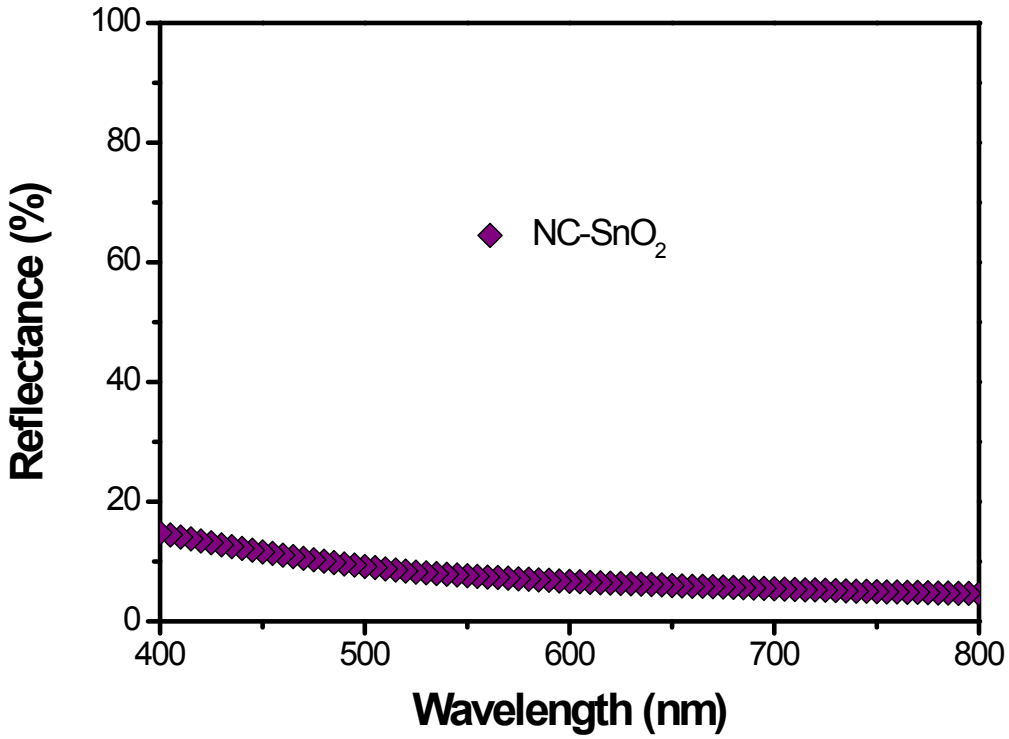


Fig. S2. Reflectance spectra of a nanocrystalline SnO_2 (NC-SnO_2) on multi-functional om-SnO_2 IF layer-coated FTO glass without N719 dye sensitizer.[a]



[a] commercially available nanocrystalline SnO_2 (NC-SnO_2) was purchased from Alpha-Aesar.

Fig. S3. Photocurrent density-voltage curves of DSSCs based on NP-SnO_2 spheres and HM-SnO_2 spheres on a multi-functional om-SnO_2 IF layer photoanode with liquid state electrolyte under AM 1.5G one sun light intensity.

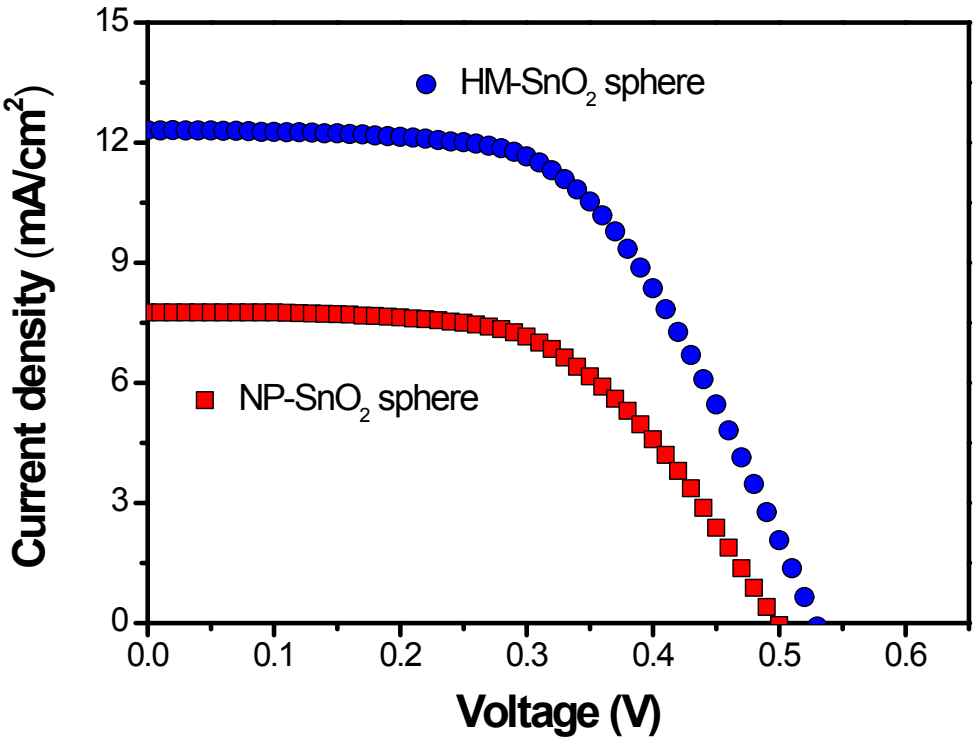


Fig. S4. Normalized efficiencies of ssDSSCs with HM-SnO_2 spheres on a multi-functional om-SnO_2 IF layer photoanode as a function of time.

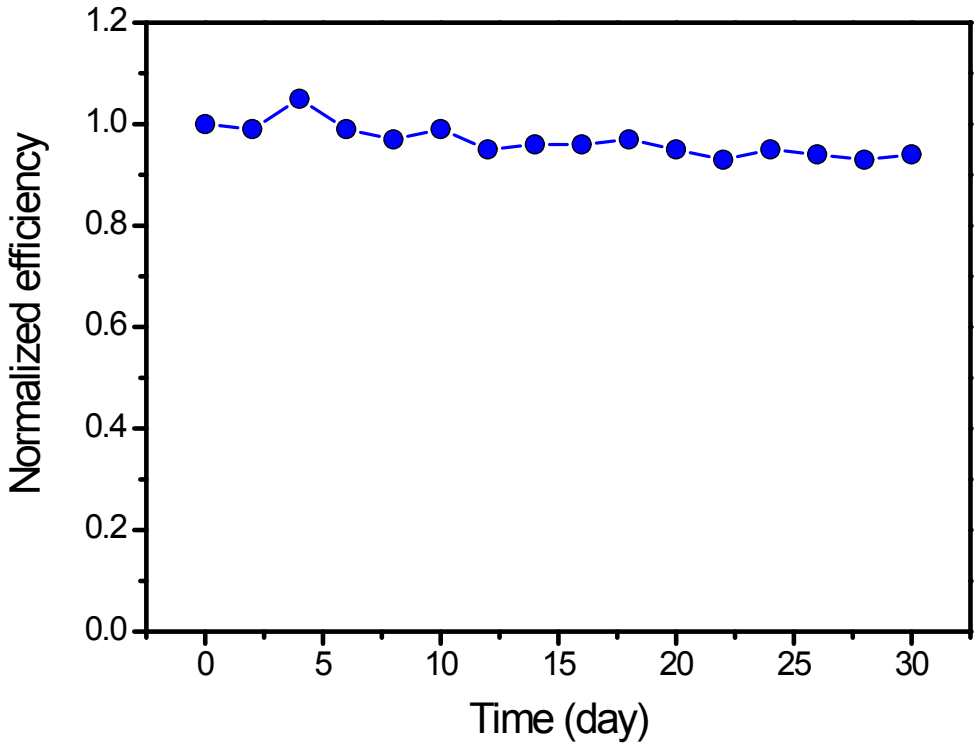


Fig. S5. Photocatalytic reactions of Degussa P25 with methyl orange under UV irradiation.

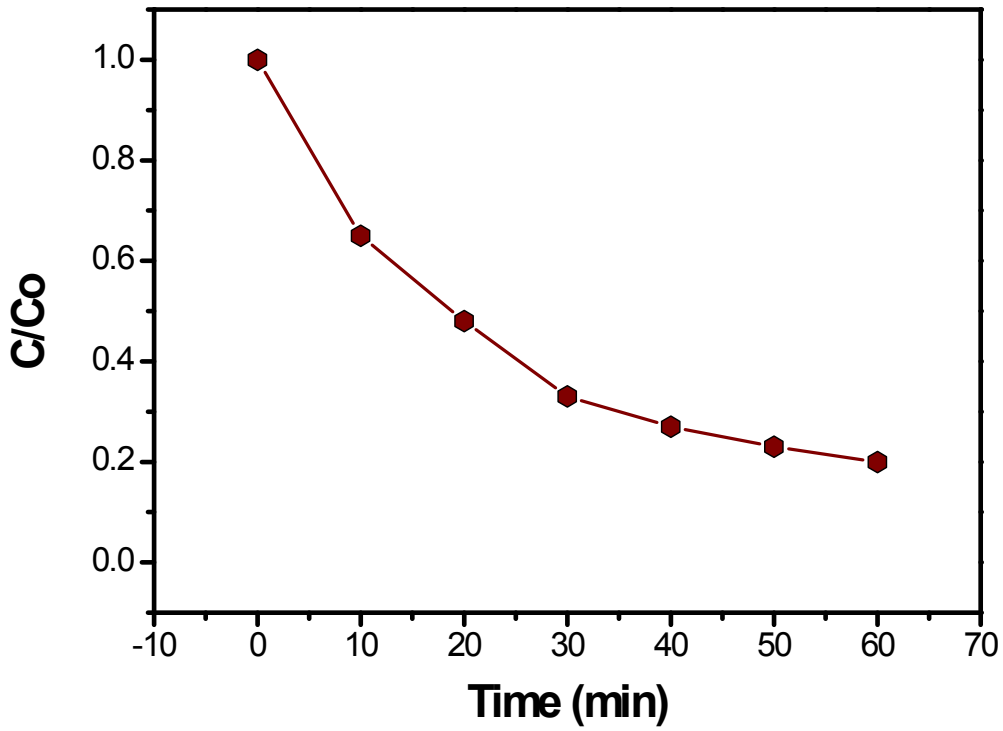
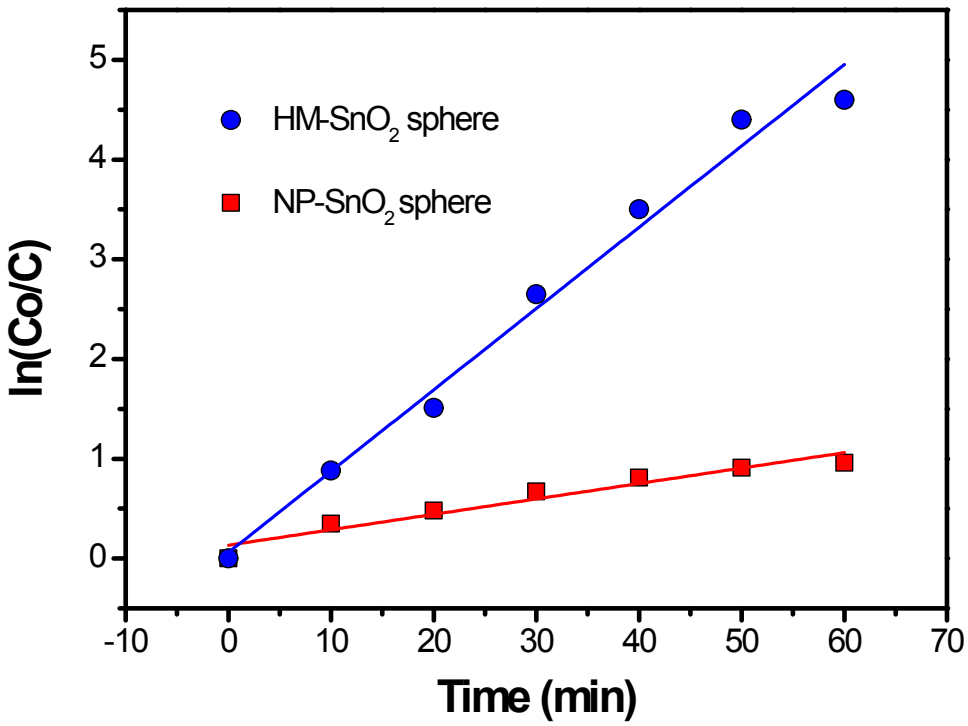


Fig. S6. Pseudo-first-order kinetic rate plots of methyl orange with NP-SnO_2 spheres and HM-SnO_2 spheres.



In pseudo-first-order kinetics of ln(Co/C)=*kt*, where Co/C is the normalized methyl orange concentration, *t* is the reaction time, and *k* is the rate constant.[1]

Table S1. Dye adsorption values for NP-SnO_2 spheres/om-SnO_2 IF layer and HM-SnO_2 spheres/om-SnO_2 IF layer photoanode.

Photoanode	Absorption at 515nm	Dye adsorbed ($nmol/cm^2$)	Dye adsorbed (mg/cm^2)
NP-SnO_2 spheres/om-SnO_2 IF layer	0.035	63.1	0.075
HM-SnO_2 spheres/om-SnO_2 IF layer	0.062	109.3	0.129

The N719 dye-sensitized SnO_2 photoanodes were dipped into 10mL of 0.01Maqueous ethanolic (1:1) alkaline solution of NaOH. The mixtures were stirred until complete desorption of the N719 dye. The volume of the alkali solution containing the fully desorbed dye was carefully measured by UV–visible spectroscopy at 515 nm. The adsorbed dye was calculated according to the Beer-Lambert law.[2]

Reference

1 V. Iliev, D. Tomova, L. Bilyarska, G. Tyuliev, *Journal of Molecular Catalysis A: Chemical* 2007, **263**, 32.

2 C.M. Leroy, C. Olivier, T. Toupance, M. Abbas, L. Hirsch, S. Ravaine, R. Backov, *Solid State Sciences* 2014, **28**, 81.