Supplementary Material (ESI) for Soft Matter

Supporting Information

One Step Route to the Fabrication of Arrays of TiO_2 Nanobowls via Complementary Block Copolymer Templating and Sol-Gel Process

Xue Li,[1] Juan Peng,[2] Joo-Hee Kang,[4] Jin-Ho Choy,[4] Martin Steinhart,[3] Wolfgang Knoll[2] and Dong Ha Kim[4*]

[1]*School of Chemistry and Chemical Engineering, University of Jinan, 106 Jiwei Road, Jinan 250022, People's Republic of China*

[2]*Max Planck Institute for Polymer Research, Ackermannweg 10, 55128 Mainz, Germany*

[3]*Max Planck Institute for Microstructure Physics, Weinberg 2, D-06120 Halle, Germany*

[4]*Division of Nano Sciences and Department of Chemistry, 11-1 Daehyun-Dong, Seodaemun-Gu, Seoul 120-750, Korea*

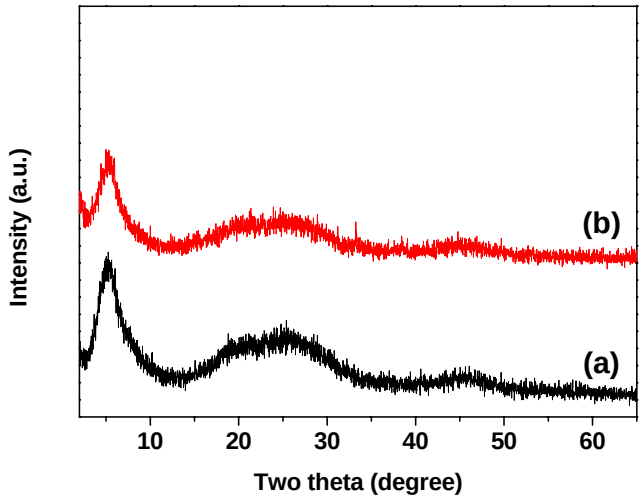

Figure S1. XRD patterns for the initial hybrid SEO/TiO_2 (a) and SEO/$HAuCl_4$(0.1)/TiO_2 (b) films.

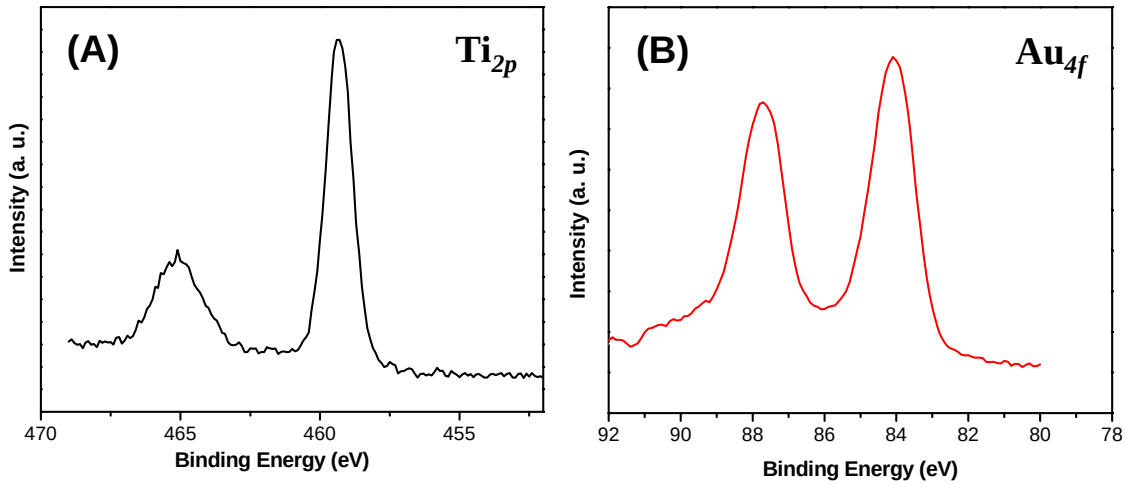

Figure S2. (a) High-resolution XPS Ti_{2p} spectrum of the surface of a porous hybrid PS-b-PEO/SG film. (b) High-resolution XPS Au_{4f} spectrum of the surface of Au/TiO_2 nanobowls obtained from porous hybrid PS-b-PEO/$HAuCl_4$/SG films after removal of the block copolymers.

The high resolution Ti_{2p} spectrum (Figure S2(A)) exhibits characteristic peaks of $Ti_{2p3/2}$ and $Ti_{2p1/2}$ in TiO_2 at 459.4 eV and 465.2, respectively.[33,34] From the composite Au/titania nanobowls by introducing $HAuCl_4$ precursor to the PS-*b*-PEO/SG system followed by the removal the block copolymer with deep UV irradiation, characteristic peaks of Au^0 at 87.6 eV ($Au4f_{5/2}$) and 84.1 eV ($Au4f_{7/2}$) on the surfaces of the nanobowls are observed (Figure B).[34] Such hybrid nanostructures can help prevent the coalesce of Au nanoparticles on TiO_2 surface.[35]

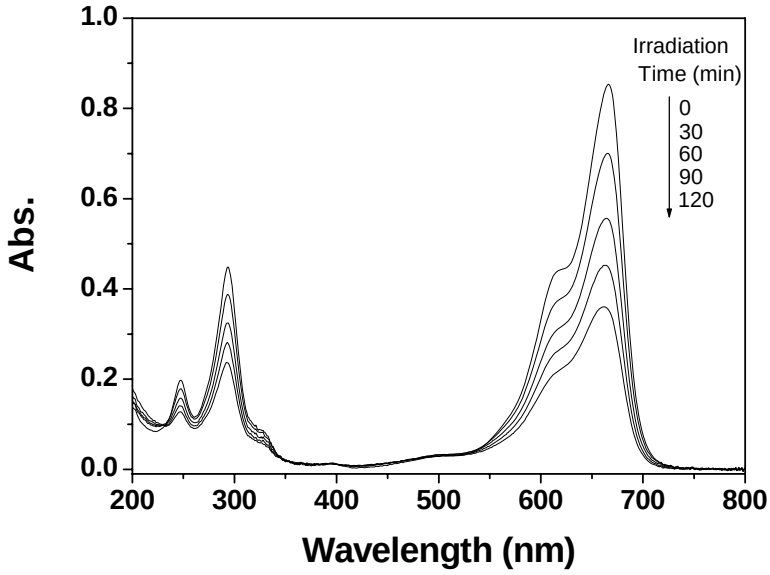

Figure S3. Photocatalytic activity of an PS-*b*-PEO/Au/TiO_2 film in terms of the decomposition of methylene blue as a function of UV irradiation time.