Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Electronic Supplementary Information

Facile microwave fabrication of CdS nanobubbles with highly efficient photocatalytic performances

Younshin Kim, Hyung-Bae Kim, and Du-Jeon Jang*

Department of Chemistry, Seoul National University, NS60, Seoul 151-742, Korea

E-mail: djjang@snu.ac.kr

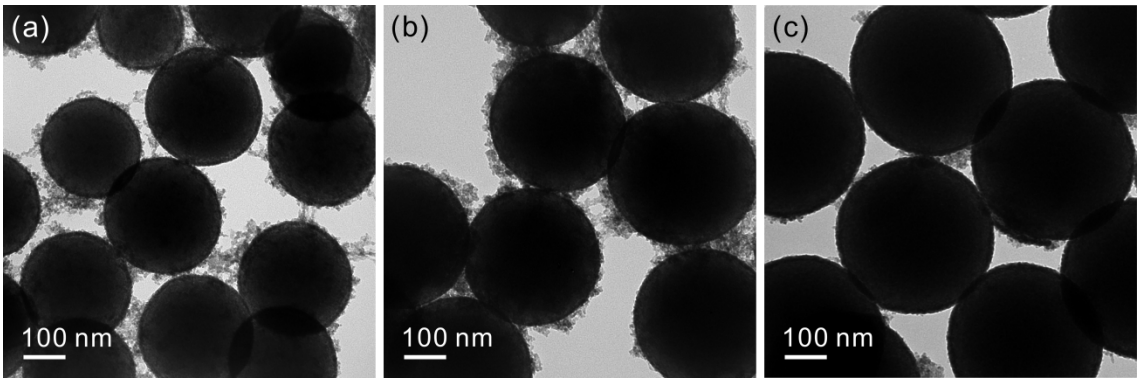

Fig. S1 TEM images of SiO_2@CdS core@shell nanocomposites of different sizes: C300 (a), C370 (b), and C400 (c).

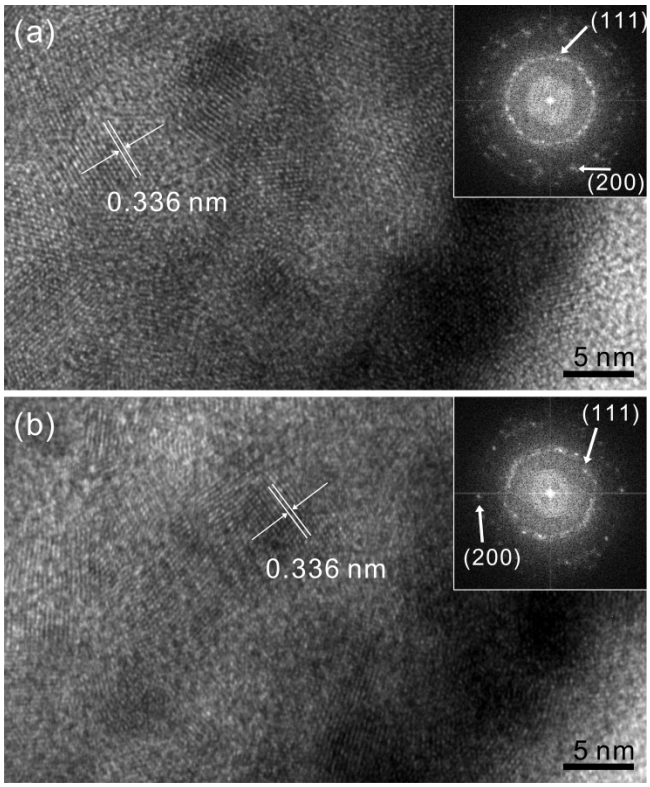

Fig. S2 HRTEM images of CdS nanobubbles B300 (a) and B400 (b) and their corresponding FFT patterns (insets).

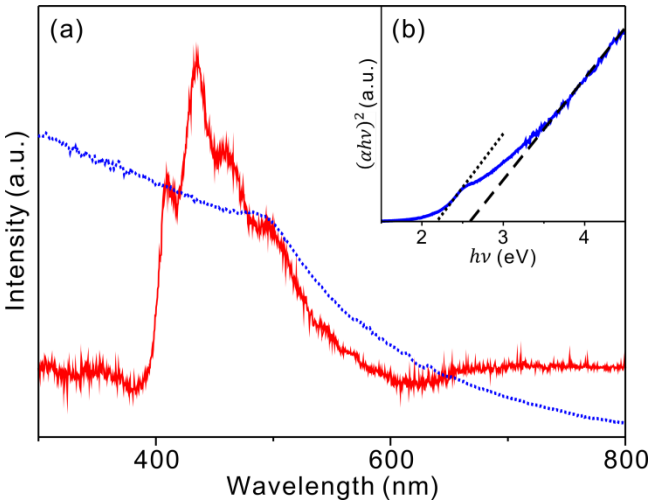

Fig. S3 Extinction (dotted) and PL, with excitation at 355 nm, (solid) spectra of B370 suspended in ethanol (a). $(\alpha hv)^2$ plots against hv after removal of scattering (c/λ^4, where c is an arbitrary constant) from the extinction spectrum to obtain the band gap of B370 (b). The intercept of the dashed line corresponds to the band gap of CdS nanobubbles while that of the dotted line corresponds to the energy gap created by sulfur-vacancy defects.

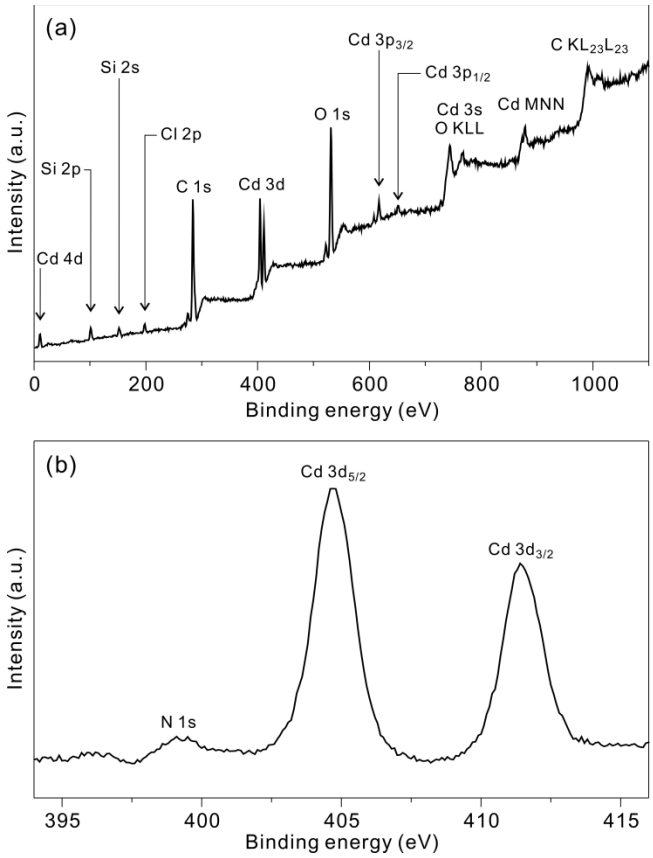

Fig. S4 Complete survey (a) and N 1s and Cd 3d close-up (b) XPS spectra of intermediate nanospheres with silica-supported nitrogenous cadmium complexes.

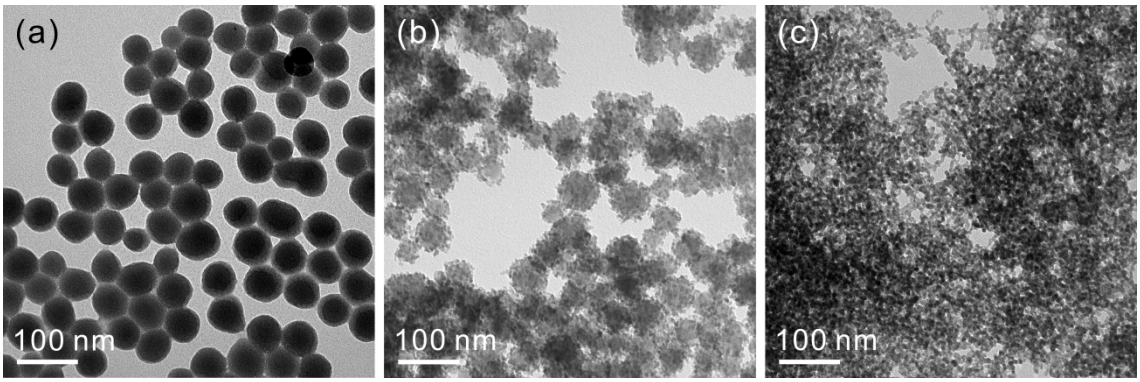

Fig. S5 TEM images showing SiO_2 core hard templates with 50 nm diameters (a), SiO_2@CdS core@shell composite structures with 60 nm diameters (b), and the product after etching (c).

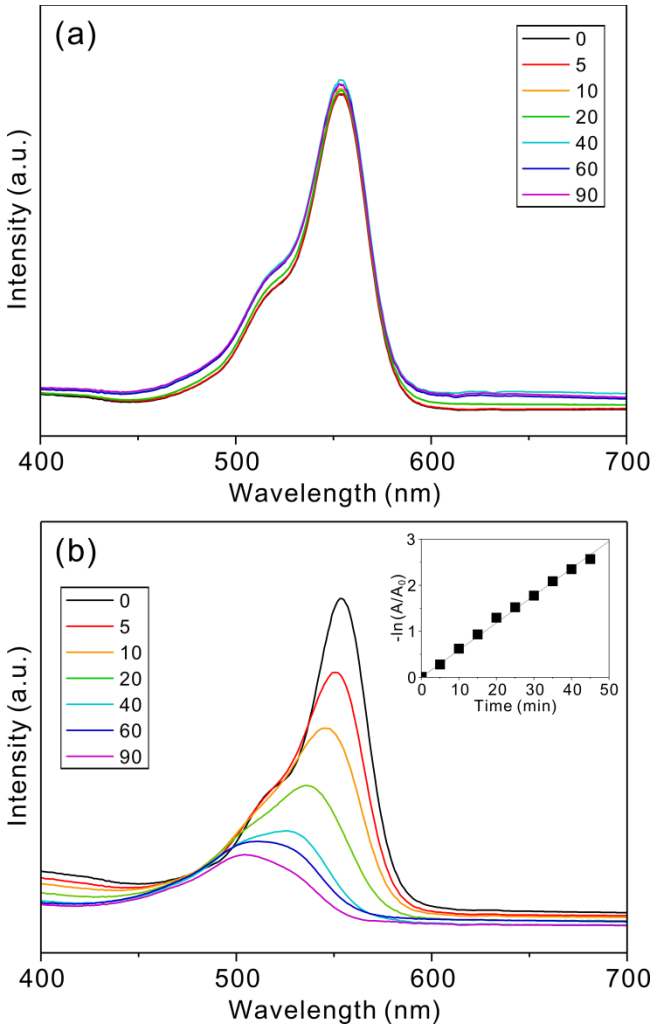

Fig. S6 Absorption spectra of 20 μM RhB aqueous solutions in the presence of natural sunlight without nanocatalysts (a) and with 0.10 g L^{-1} nanocatalyst B370 (b) measured at elapsed times indicated in the units of min. These experiments were carried out on a sunny fall day from 2 p.m. on the 24th of September in Seoul, Korea, where the maximum temperature of the day was 27 °C and the minimum was 17 °C. The plot of $-\ln(A/A_0)$ vs. t, shown in the inset, has yielded a degradation rate constant of 0.059 ± 0.001 min^{-1}.

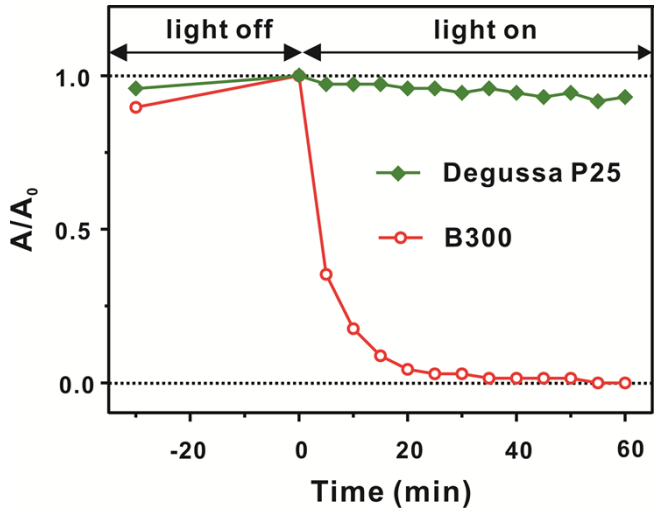

Fig. S7 Photocatalytic degradation of RhB in water with 0.1 g L^{-1} of B300 or Degussa P25 under Xe-lamp irradiation.