Supporting information

Fabrication of novel g-C_3N_4/nanocage ZnS composites with enhanced photocatalytic activities under visible light irradiation

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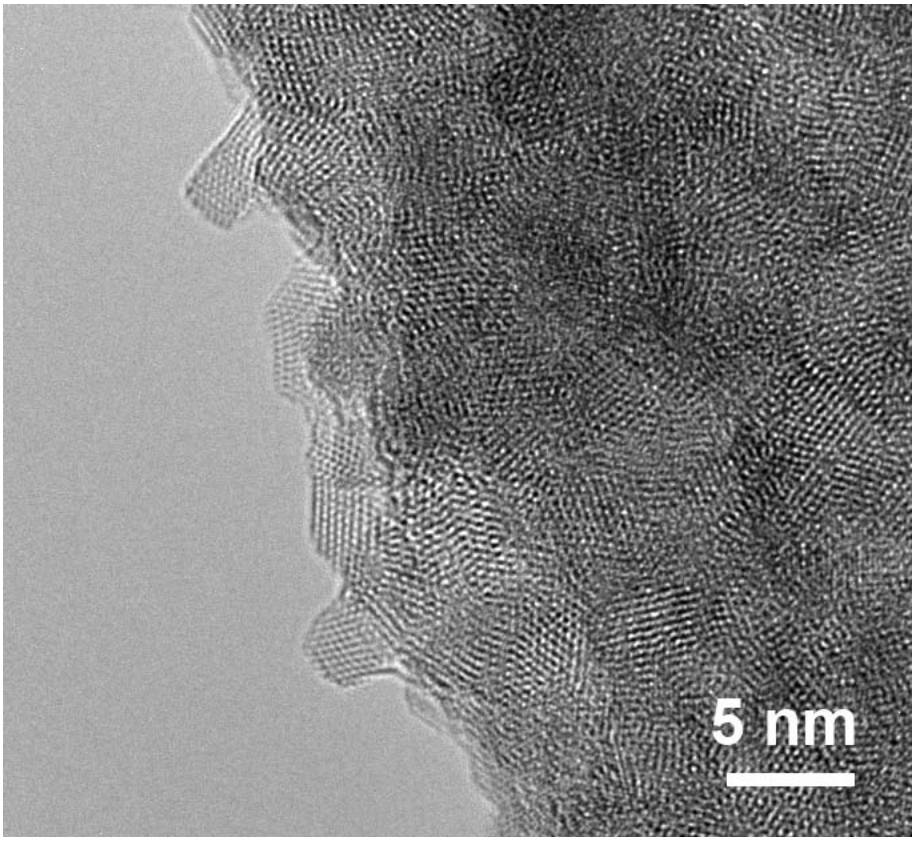

Figure S1. HRTEM of pure ZnS nanocages.

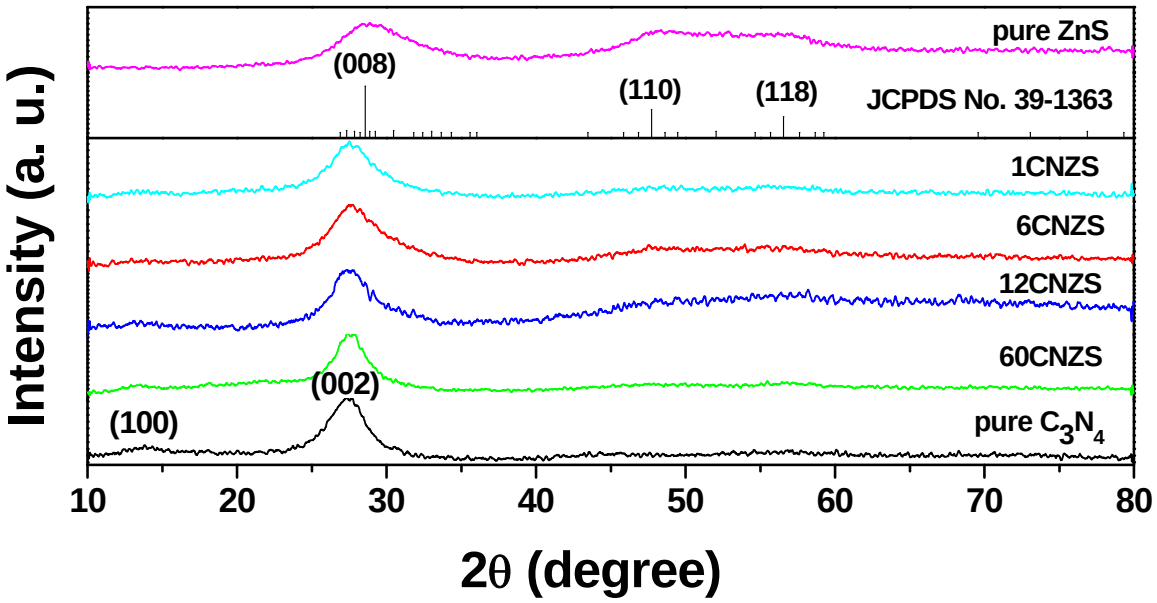

Figure S2. XRD patterns of pure g-C_3N_4, ZnS, and g-C_3N_4/ZnS composites.

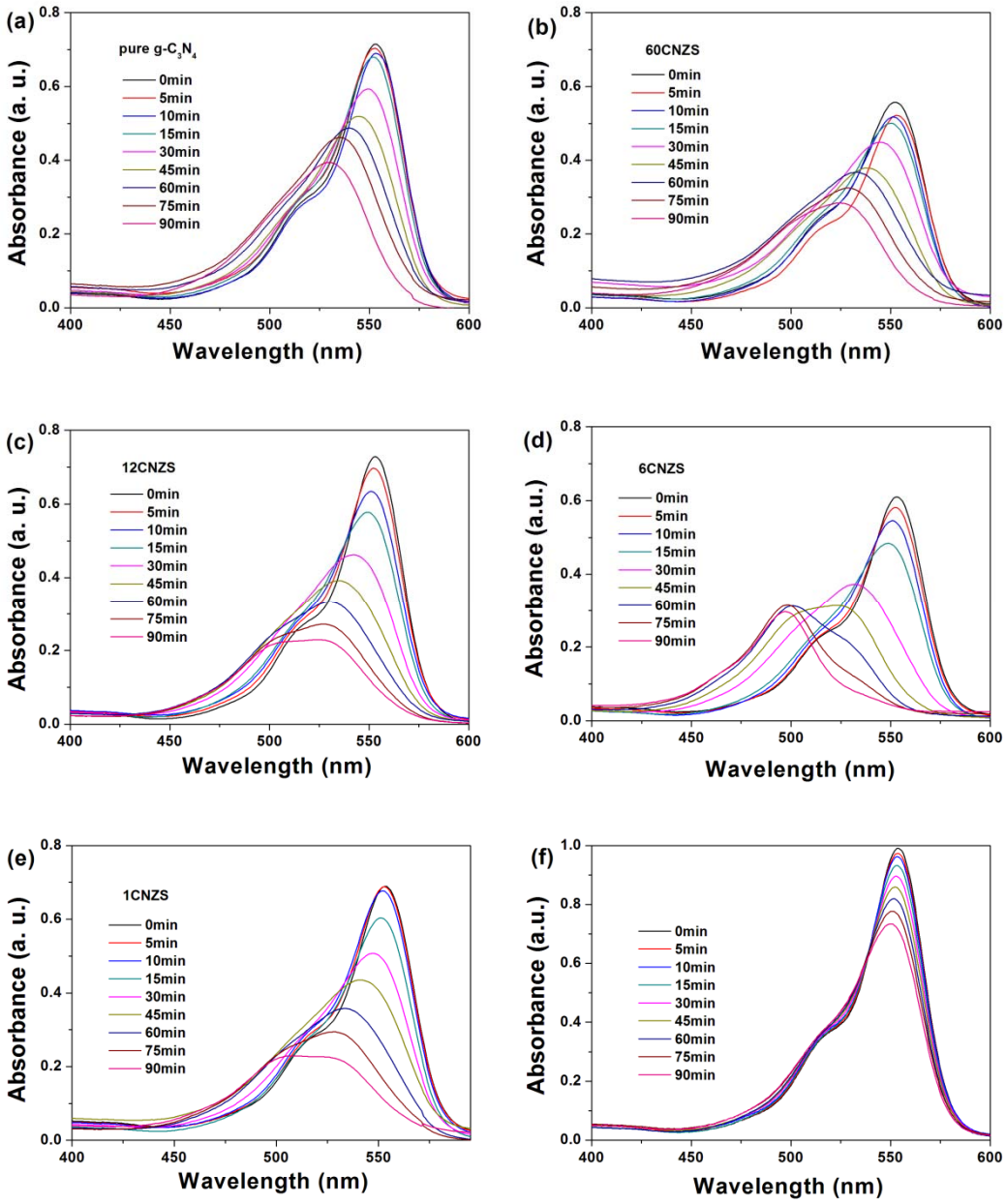

Figure S3. UV-visible spectral changes of RhB over the photocatalysts of pure g-C_3N_4 (a), 60CNZS (b), 12CNZS (c), 6CNZS (d), 1CNZS (e) and pure P25 (f).

The temporal evolution of the spectral changes taking place during the degradation of RhB over the photocatalysts was shown in Figure S3. In all the cases, the visible light irradiation on the aqueous RhB/catalyst (including pure g-C_3N_4 and the CNZS composites) suspensions resulted in an obvious decrease in the absorption. As the characteristic absorption peak at 553 nm was employed to determine the degradation degree of RhB, the 6CNZS catalyst showed the highest photocatalytic activity. Meanwhile, the spectral maximum shifted toward the blue region gradually, which can be attributed to the de-ethylation of the fully *N,N,N',N'*-tetraethylated rhodamine

molecule (i.e., RhB) in a stepwise manner. The spectral peaks of the de-ethylated intermediates located at different positions: RhB, 553 nm; *N*,*N*,*N*'-tri-ethylated rhodamine, 539 nm; *N*,*N*'-di-ethylated rhodamine, 522 nm; *N*-ethylated rhodamine, 510nm; and rhodamine, 498 nm. Compared to the other photocatalysts, the hypsochromic shift in the presence of 6CNZS is more pronounced than that in the other catalysts system. In Figure S3(d), the band shifted from 553nm to 498nm in the 6CNZS photocatalytic system, indicating the complete de-ethylation of tetraethylated rhodamine (RhB) to rhodamine (Rh). From this aspect, the catalyst of 6CNZS also performed the best photocatalytic activity.