Electronic Supplementary Information:

Facile synthesis of size-tunable $Cu_{39}S_{28}$ micro/nanocrystals and small-sized configuration enhanced visible-light photocatalytic activity

Chenyan Wang, Zhen Fang,* Fan Fan, Xiaona Dong, Yin Peng, Shenghua Hao, Liuyang Long,

Key Laboratory of Functional Molecular Solids, Ministry of Education, College of Chemistry and Materials Science, Anhui Normal University, Wuhu, 241000, P. R. China; E-mail: fzfscn@mail.ahnu.edu.cn

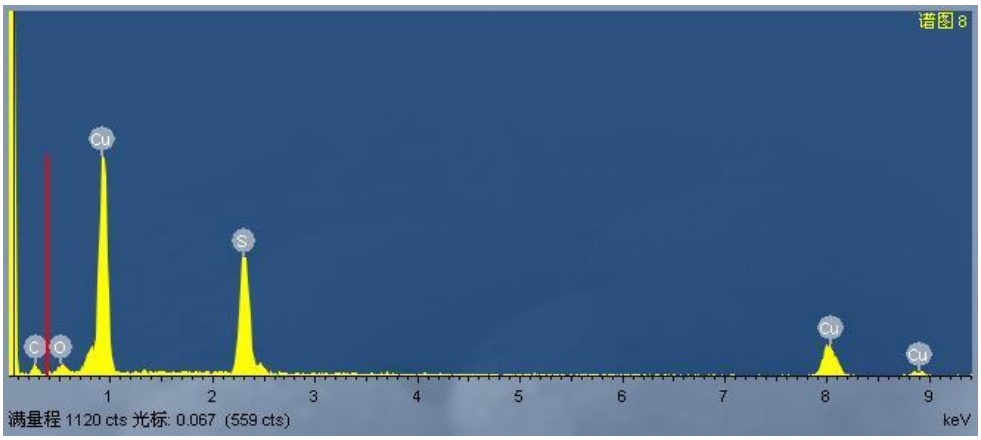

Fig. S1 EDS spectrum of the $Cu_{39}S_{28}$ nanocrystals.

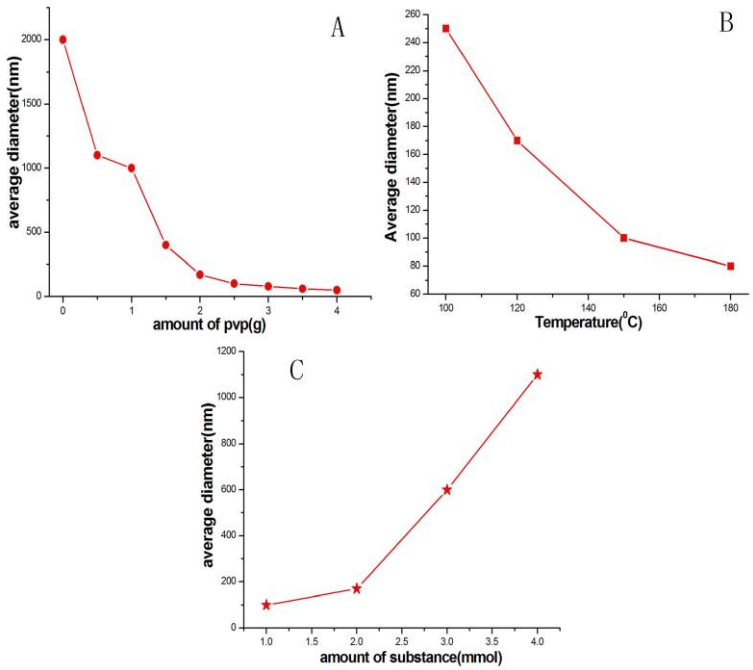

Fig. S2 The statistical analysis of average diameter with respect to (A) the amount of PVP, (B) reaction temperature, (C) concentration of reactants.

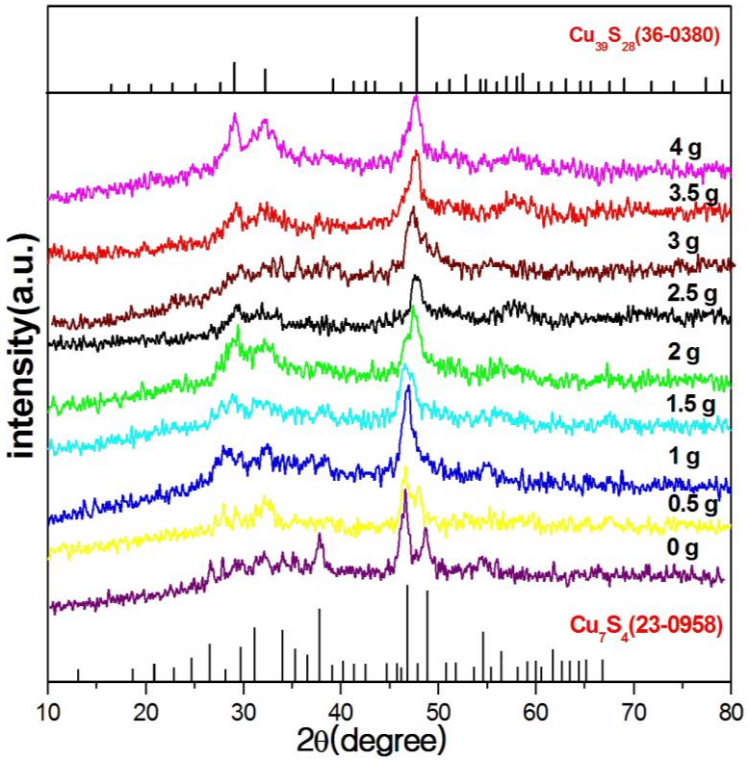

Fig. S3 XRD patterns of the samples obtained by adding different dosage of PVP at 120 °C for 12 h.

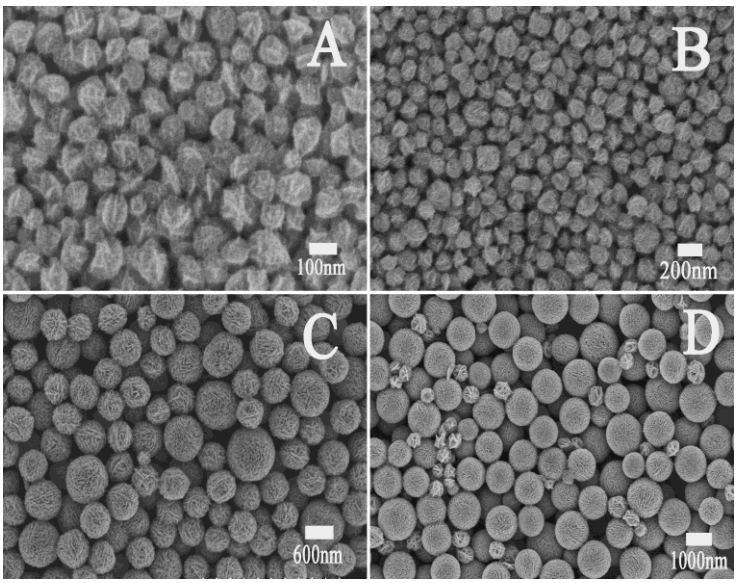

Fig. S4 SEM images of the as-synthesized samples by using different concentration of reactants at 120°C for 12h: (A) 1 mmol, (B) 2 mmol, (C) 3 mmol, (D) 4 mmol.

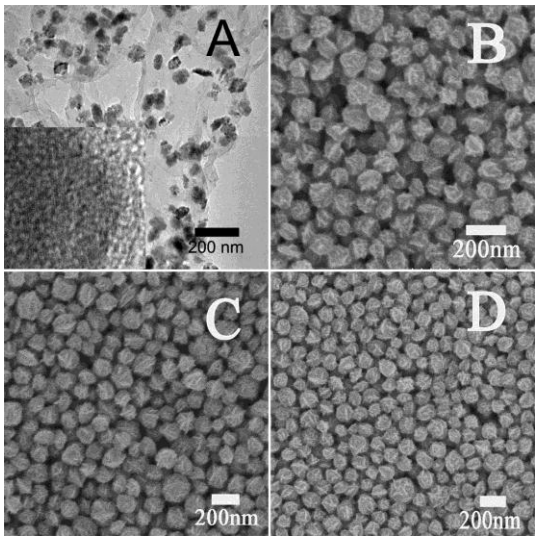

Fig. S5 TEM image (inset: corresponding HRTEM image) and SEM images of the samples obtained at different heated time. (A) 40 min; (B) 1 h; (C) 6 h; (D) 12 h.

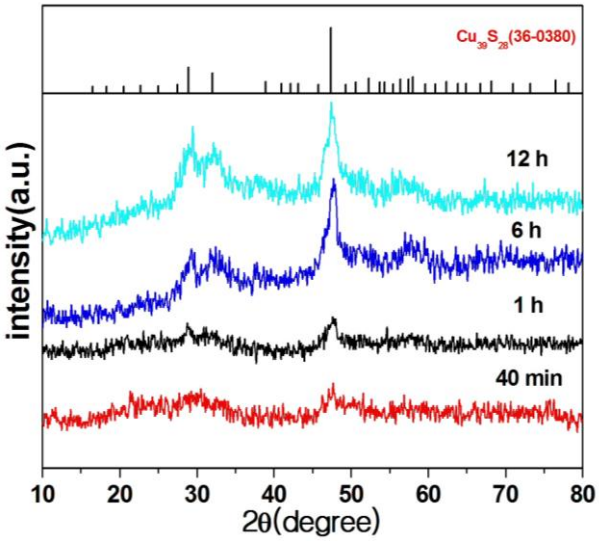

Fig. S6 XRD patterns of the samples obtained at different heated time.

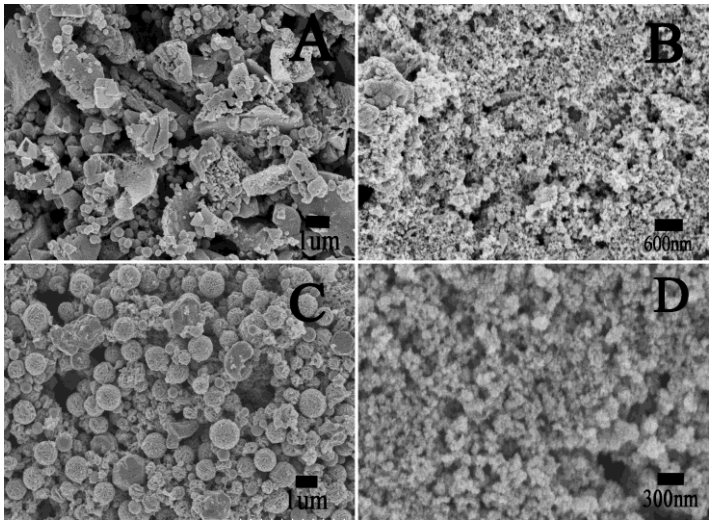

Fig. S7 SEM images of the samples obtained by using different sulfur source at 120 ^{o}C for 12 h: (A) sodium thiosulfate, (B) sodium sulfide, (C) thioacetamide, (D) ammonium sulfide.

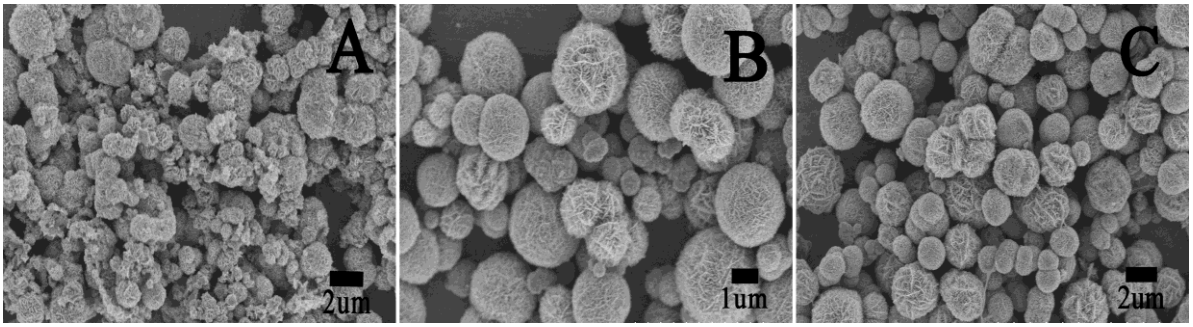

Fig. S8 SEM images of the as-synthesized samples by using different surfactants at 120 ºC for 12 h: (A) lauryl sodium sulfate, (B) Polyethylene Glycol 4000, (C) polysorbate 40.

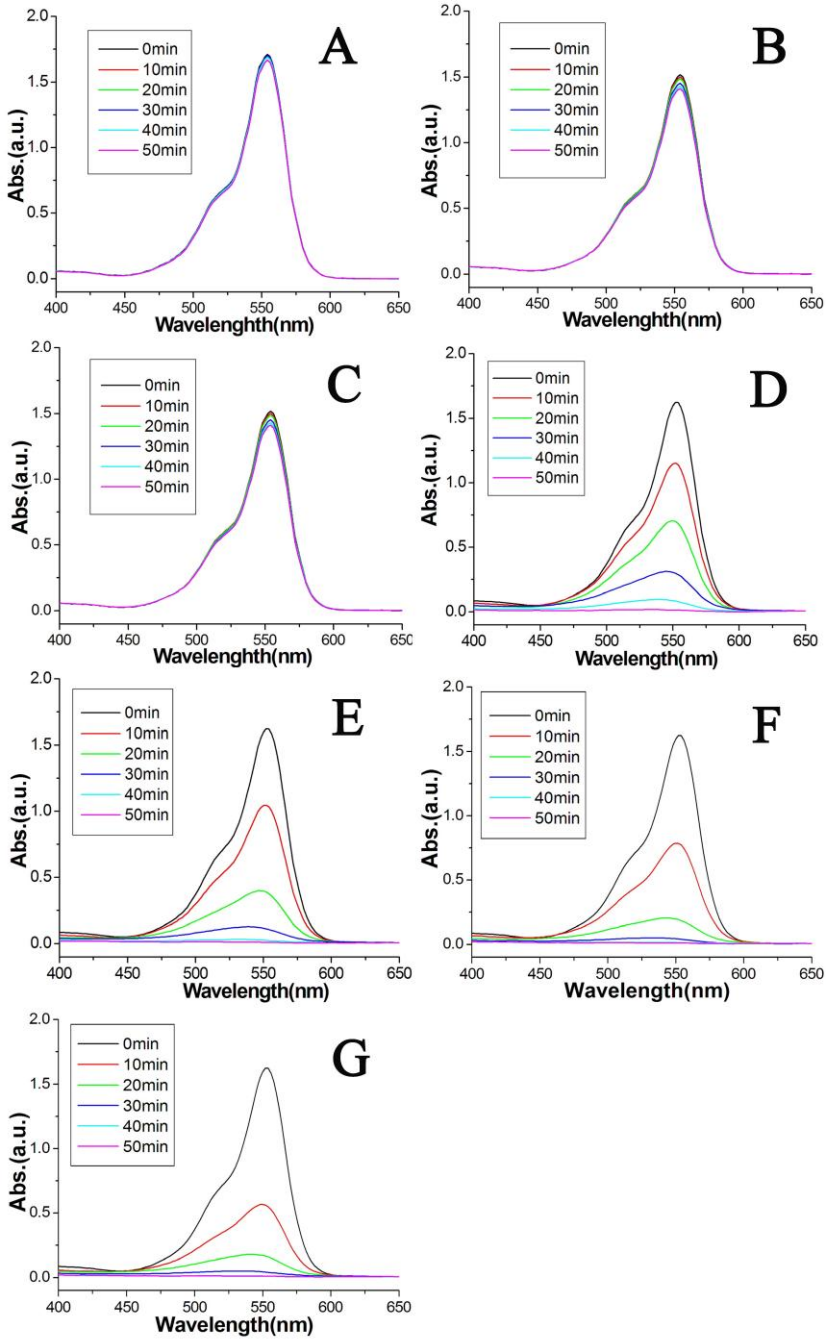

Fig. S9 UV–vis absorption spectra of RhB at different time interval under visible light: (A) without any catalyst, (B) only $Cu_{39}S_{28}$ NCs, (C) only H_2O_2, (D) 1100 nm $Cu_{39}S_{28}$ + H_2O_2, (E) 400 nm $Cu_{39}S_{28}$ + H_2O_2, (F) 170 nm $Cu_{39}S_{28}$ + H_2O_2, (G) 50 nm $Cu_{39}S_{28}$ + H_2O_2.

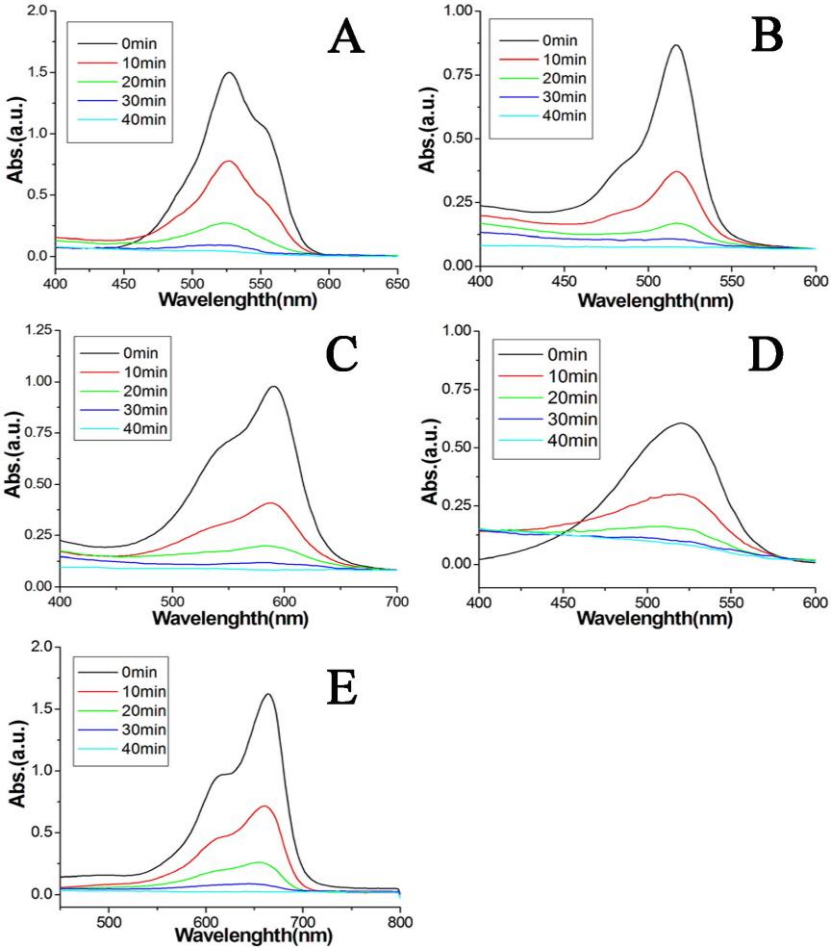

Fig. S10 UV–vis absorption spectra of various dyes at different time interval under visible light: (A) Pyronine B, (B) Eosin, (C) Crystal violet, (D) Safranine T, (E) Methylene blue.