Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary Information

One-step green route to synthesize copper nanocrystals and their applications in catalysis and surface enhanced Raman scattering

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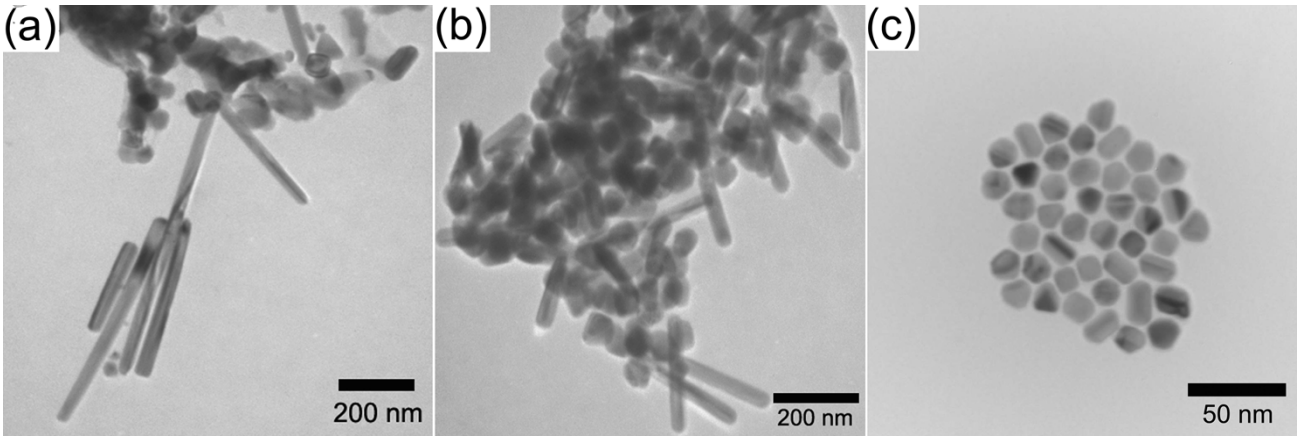

Fig. S1 TEM images of the as-prepared Cu NCs upon changing the parameters in the synthetic system; (a) 330 ^{o}C with 1 mmol CuO and 4 mL olive oil; (b) 1 mmol CuO and 3 mL olive oil; (c) 1 mmol CuO and 5 mL olive oil.

We have carried out a series of experiments to tune the size and morphology of the Cu NCs by varying the temperature and the amount of olive oil. As shown in Fig.S1a, when the temperature was elevated to 330 ^{o}C, the obtained sample was a mixture of quasi-nanospheres and nanorods with broad size distribution. When the volume of olive oil was adjusted to 3 mL and 5 mL, the TEM images of the obtained samples were shown in Fig.S1b and Fig.S1c, respectively. These results indicate that the size and morphology of the samples both changed greatly when we modified the reaction conditions. The optimal conditions for preparing copper nanocubes was shown in the manuscript, the size of the copper nanocubes can be tuned by prolonging the reaction time.

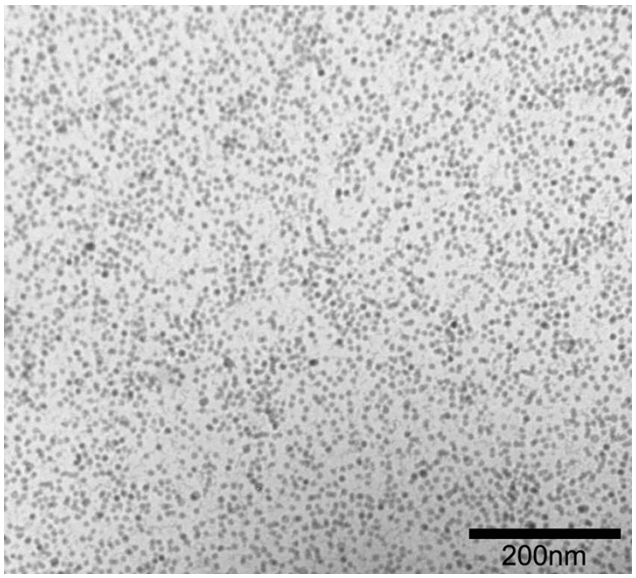

Fig. S2 The typical TEM image of the as-prepared Cu nanoparticles using oleic acid as the only solvent.

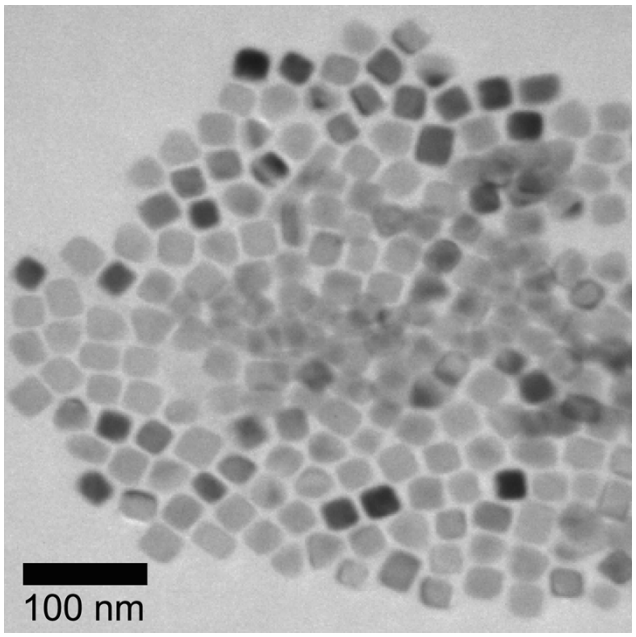

Fig. S3 TEM image of Cu NCs synthesized using the olive oil of different batch.

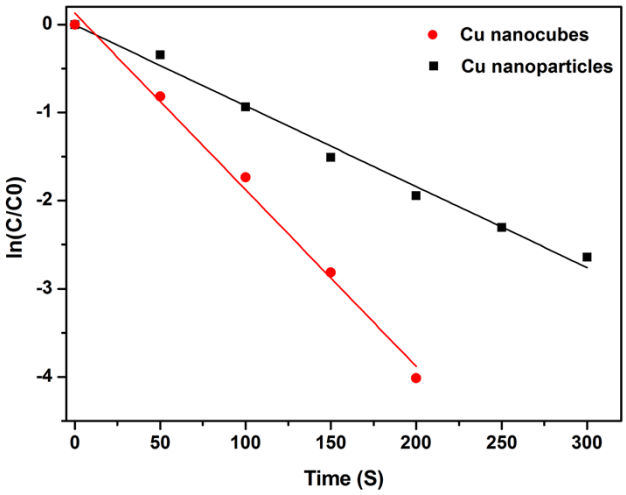

Fig. S4 Plots of $\ln(C/C_0)$ of of the catalytic reduction reaction of methylene blue catalyzed by 18.61 nm Cu nanocubes and 31.55 nm Cu nanoparticles.

Fig.S4 represents the linear plots of $\ln(c/c_0)$ versus time of 18.61 nm Cu nanocubes and 31.55 nm Cu nanoparticles. The rate constants were calculated to be 0.020 s^{-1} and 0.009 s^{-1} for 18.61 nm Cu nanocubes and 31.55 nm Cu nanoparticles, respectively. In addition, the turnover frequency (TOF) of 18.61 nm Cu nanocubes and 31.55 nm Cu nanoparticles were calculated to be 0.019 s^{-1} and 0.017 s^{-1}. The higher TOF value indicates that the {100} planes ars more active than {111} planes.

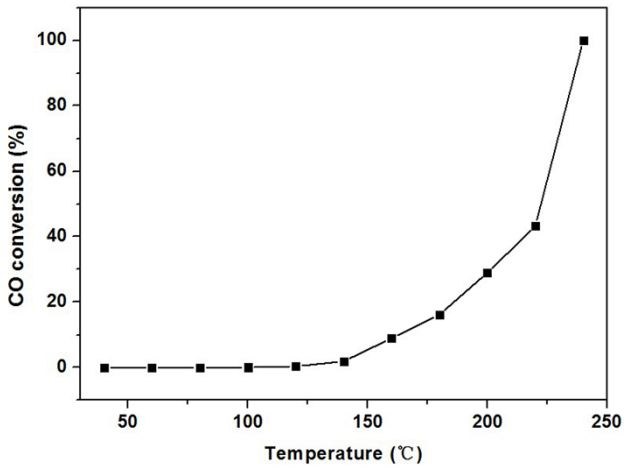

Fig. S5 CO conversions *vs* reaction temperature over pure ferric hydroxide.

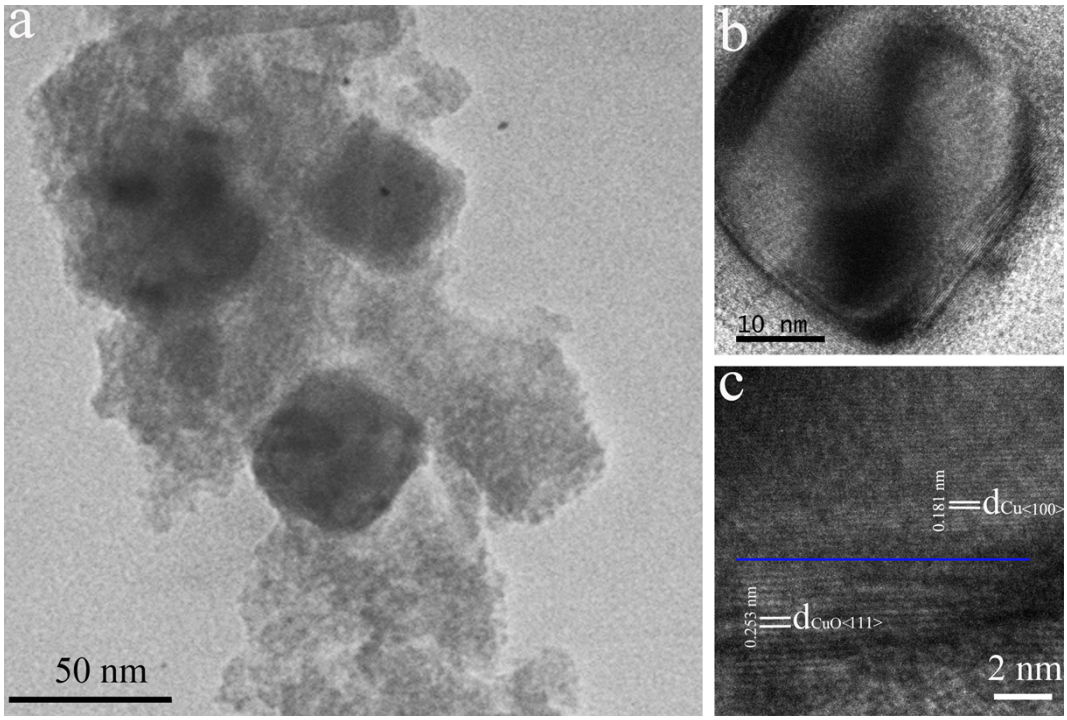

Fig. S6 TEM and HRTEM images of the as-synthesized Cu/ferric hydroxide obtained by drying at 200 ℃ for 6 h. (a) A low-magnification TEM image of the Cu/ferric hydroxide. (b) A high-magnification TEM image of the Cu/ferric hydroxide. (c) An interfacial HRTEM image of the Cu/ferric hydroxide.

Fig.S6 shows the TEM and HRTEM images of the as-synthesized Cu/ferric hydroxide obtained by drying at 200 ℃ for 6 h, which indicates the shape and size of Cu NCs does not change. However, through an interfacial HRTEM image of the Cu/ferric hydroxide (Fig.S6c), we can observe that the thin Cu oxide (CuO) layer is formed at Cu/ferric hydroxide interface.