Electronic Supplementary Material (ESI) for RSC Advances.

Reduced Graphene Oxide-Stabilized Copper Nanocrystals with Enhanced Catalytic Activity and SERS Property

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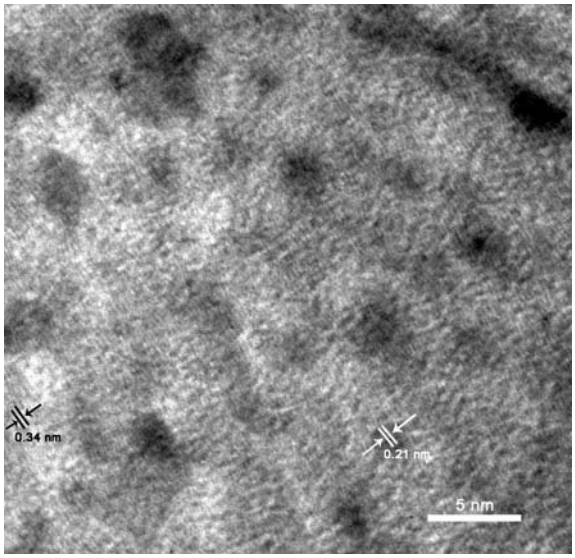

Fig. S1 HRTEM image of the obtained copper/RGO composite

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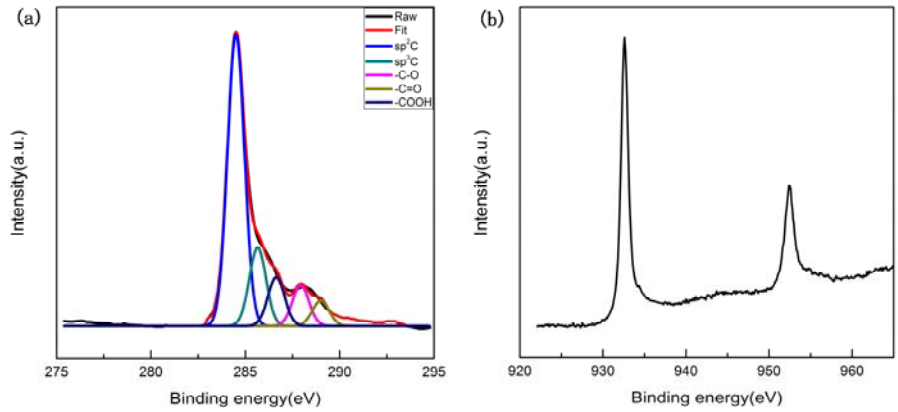


Fig. S2 The XPS spectra Of Cu/rGO (a) The C1s at 284.55eV, 285.65eV, 286.65eV, 287.95eV, 289.0eV (b) the Cu 2p3/2 and 2p1/2 XPS spectra at 932.6eV, 952.5eV

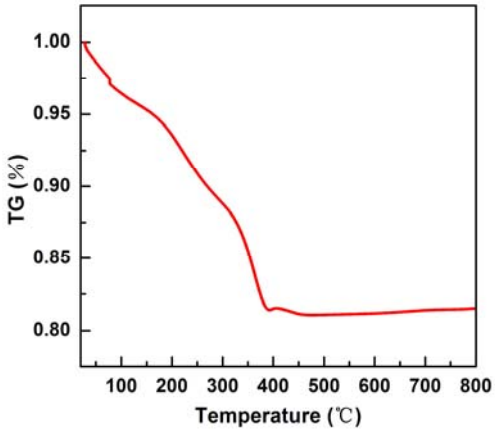


Fig. S3 TGA curves of Cu/rGO nanocomposite in air.

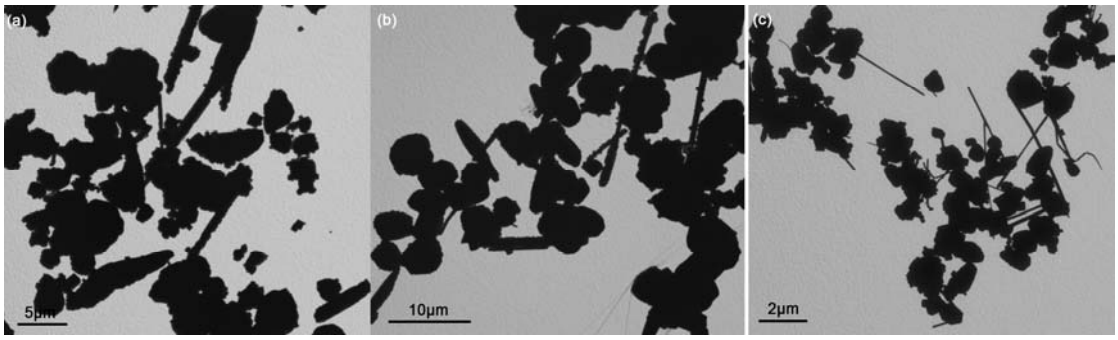


Fig. S4 TEM images of obtained copper products without GO (a) pH= 6 (b) pH= 8 (c) pH= 12

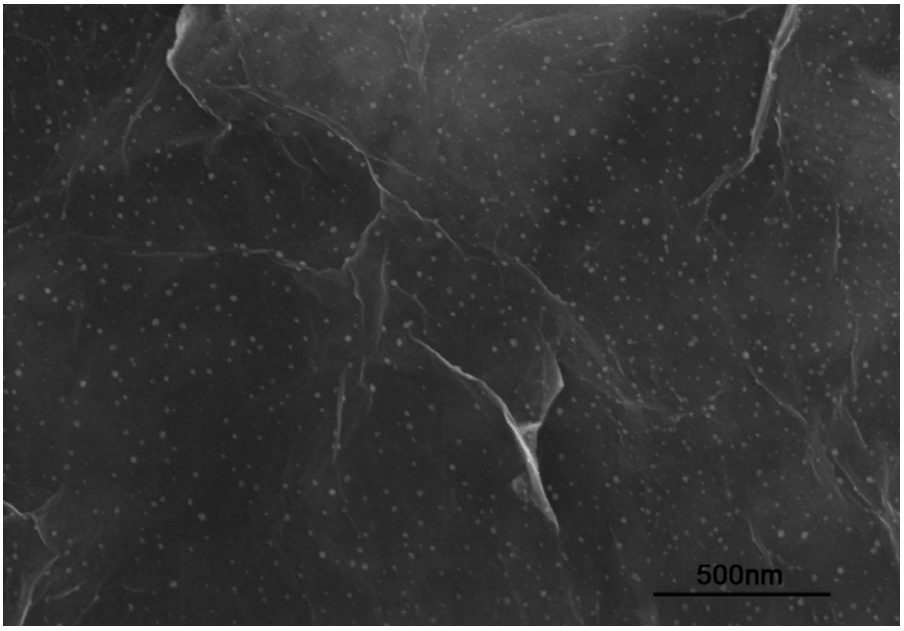


Fig. S5 SEM image of the obtained Cu/rGO nanocomposites at pH= 10

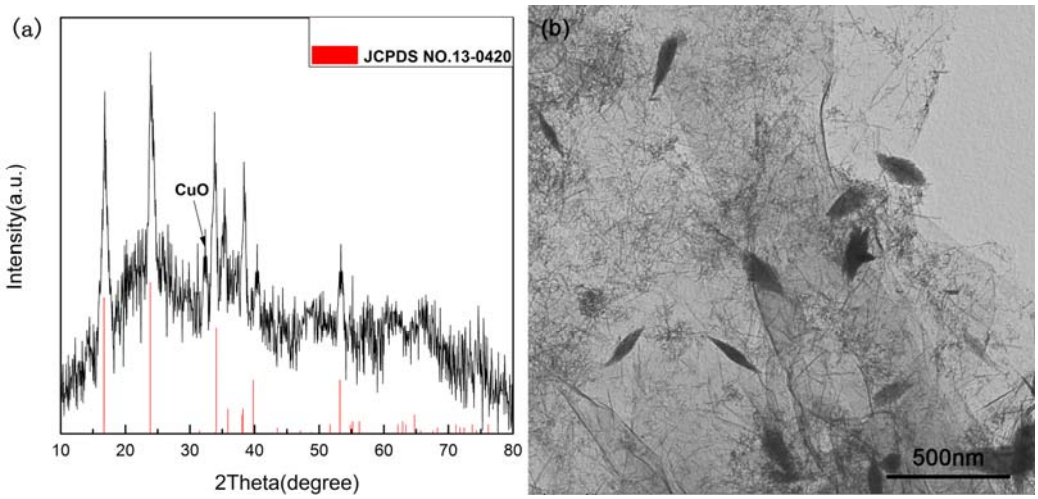


Fig. S6 The XRD pattern and TEM image of the obtained intermediate product before adding ascorbic acid

Notes: In order to further clarify the synthesis mechanism, the XRD and TEM of the obtained intermediate sample before adding ascorbic acid are given in Fig. S6. As shown in Fig. S6 (a), the characteristic XRD peaks are mainly assigned to orthorhombic $Cu(OH)_2$ (JCPDS 80-1268), and a weak pattern peak of monoclinic CuO (JCPDS 80-1268) is present. The appearance of the diffraction peak of the copper oxide should be attributed to the transformation from $Cu(OH)_2$ to CuO. The

corresponding TEM shows that the intermediate products exhibit dispersed nanowire morphology. Moreover, $Cu(OH)_2$ is known to spontaneously form 1D nanostructures in water (*Chem. Mater.* **2006**, *18*, 1795). The XRD and TEM results clearly indicates $Cu(OH)_2$ intermediates are firstly formed on the rGO in the second step.

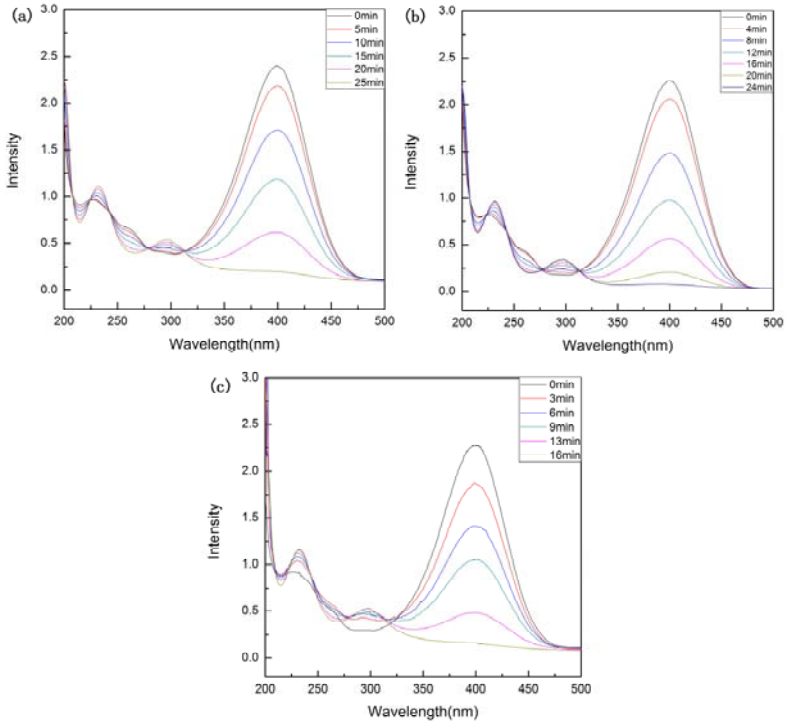


Fig. S7 Successive UV–Vis spectra of the reduction reaction (a) Cu/rGO pH=6 (b) Cu/rGO pH=8 (c) Cu/rGO pH=12

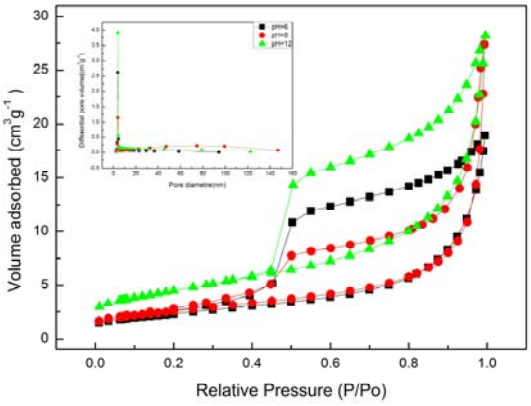


Fig. S8 N_2 adsorption-desorption isotherm and corresponding pore-size distribution curves (inset) of the obtained pure Cu/rGO obtained at different pH.

Table S1 The BET surface area, pore volume and average pore size

Samples	S_{BET} (m^2g^{-1})	Pore volume (cm^3g^{-1})	Pore size (nm)
Cu/rGO (pH=6)	28.5	0.018	2.528
Cu/rGO (pH=8)	30.4	0.027	3.866
Cu/rGO (pH=10)	40.7	0.045	4.200
Cu/rGO (pH=12)	40.1	0.033	3.882

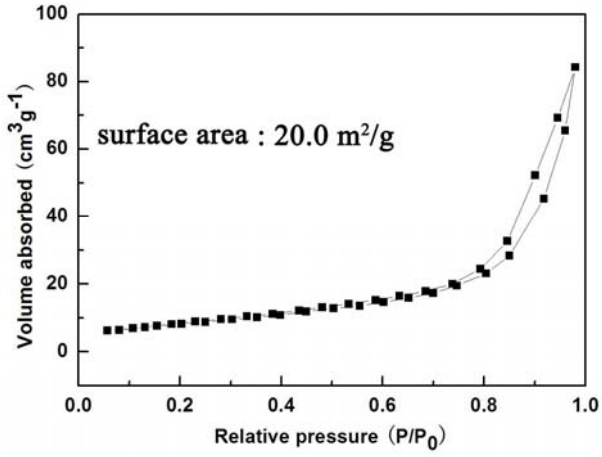
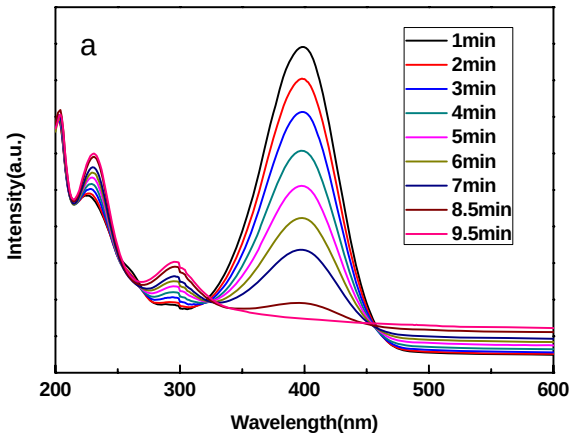


Fig. S9 N_2 adsorption–desorption isotherm of the pure Cu nanoparticles.



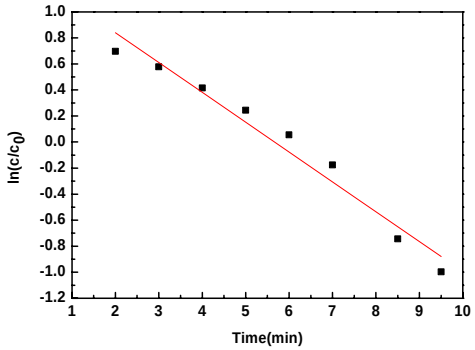


Fig. S 10 a) Successive UV-vis spectra of reduction reaction. b) Absorbance ln(C/ C0) vs. time plot for the reduction of 4-NP with obtained solid catalysts (T 298 K)

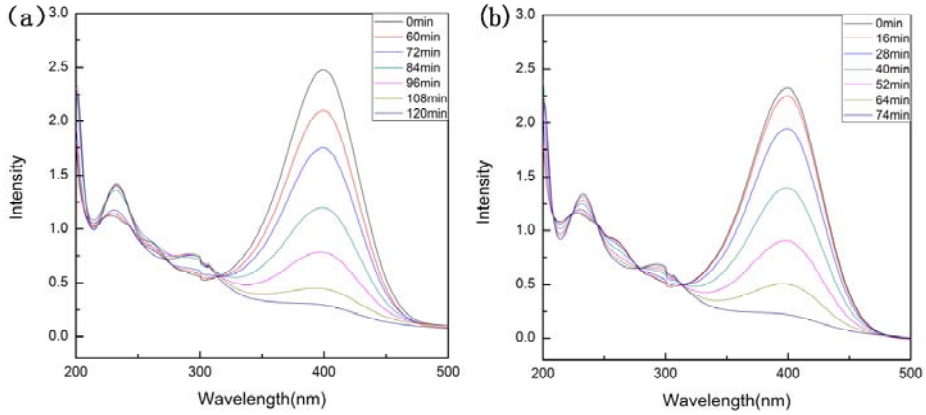


Fig. S11 Successive UV–Vis spectra of the reduction reaction (a) Cu_2O/rGO (b) CuO/rGO

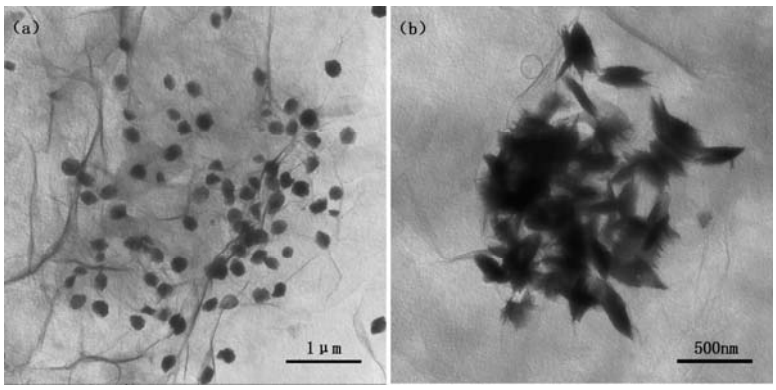


Fig. S12 TEM images (a) Cu_2/rGO (b) CuO/rGO