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Electronic Supplementary Information

Simultaneous Cu Doping and Growth of TiO_2 Nanocrystalline Array Film as a Glucose Biosensor

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Equation (S1) for tetragonal-system compounds, the change in unit cell parameters (*a, b, c*) could be deduced.

$$d_{(hkl)} = \frac{1}{\sqrt{\frac{h^2}{a^2} + \frac{k^2}{b^2} + \frac{l^2}{c^2}}} \quad (a = b \neq c, \alpha = \beta = \gamma = 90°) \qquad \text{(S1)}$$

Figure S1 shows the basic characterization of Cu colloidal nanoparticles (NPs) by LAL technique. In Fig. S1(a), the NPs intensively accumulated together so as to difficult discrimination of their morphology and size. Fig. S1(b) shows the observation via TEM. It was affirmed that the NPs did not have regular shape. The bigger NPs were comprised by many smaller ones. The size range was roughly estimated as from 5 nm to 50 nm. According to XRD pattern, part of the diffraction peaks were indexed well with cubic Cu (JCPDS No. 04-0836) and orthorhombic $Cu(OH)_2$ (JCPDS No. 35-0505). However, the other peaks could simultaneously indexed with monoclinic CuO (JCPDS No. 45-0937) and Cubic Cu_2O (JCPDS No. 65-3288). We supposed that such formed Cu colloid was mainly composed of metal copper, copper hydroxide and copper oxides.

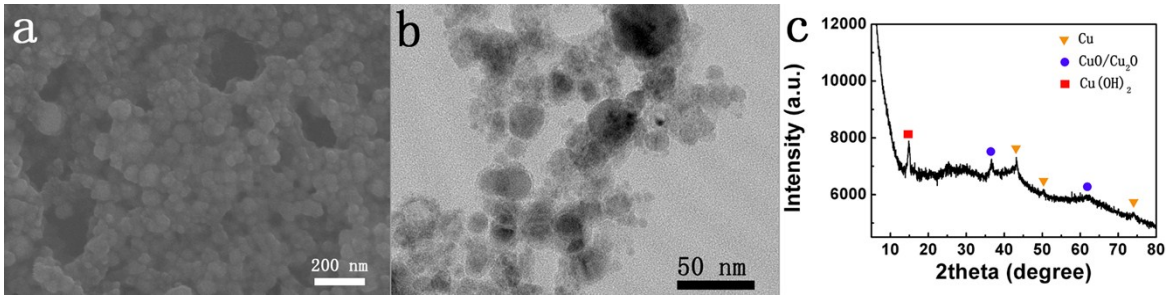
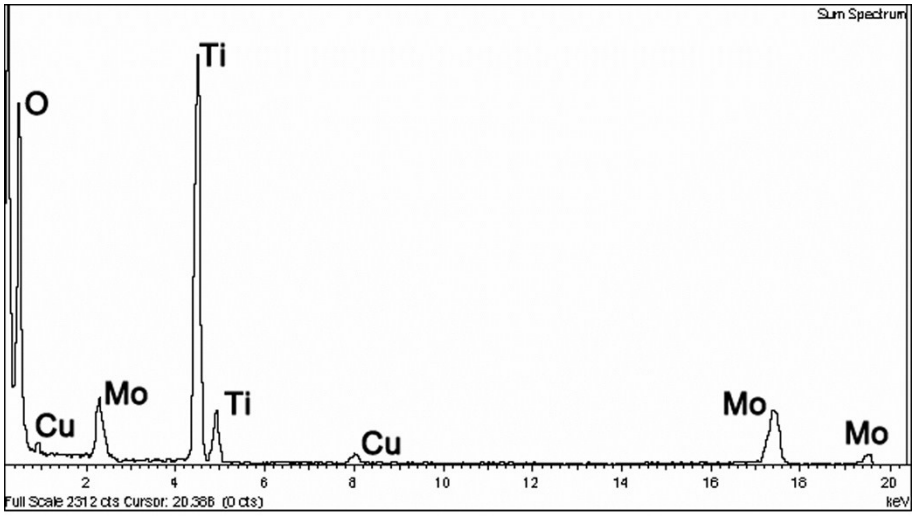


Fig. S1 (a) SEM image, (b) TEM image and (c) XRD pattern of Cu colloid nanoparticles.



Elements	Peak Area	Area Sigma	K Factor	Abs Correction	Weight%	Weight%	Atomic%
O K	6753	220	1.326	2.344	48.44	0.90	77.86
Ti K	16981	212	0.768	1.011	30.45	0.59	16.35
Cu K	430	50	1.000	1.000	0.99	0.12	0.40
Mo K	4008	136	2.193	0.992	20.13	0.64	5.40
Totals					100.00		

Fig. S2 EDX spectrum of Cu-TNPs and the table of corresponding elements calculation.

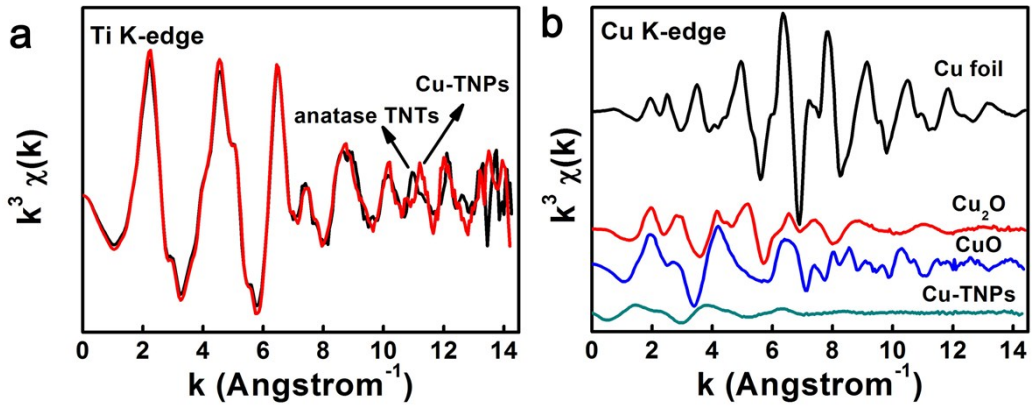


Fig. S3 (a) Ti K-edge EXAFS spectra of anatase TNTsand Cu-TNPs, Ti K-edge; (b) Cu K-edge EXAFS spectra of Cu foil, Cu_2O, CuO and Cu-TNPs through k^3-weighted Fourier Transform.

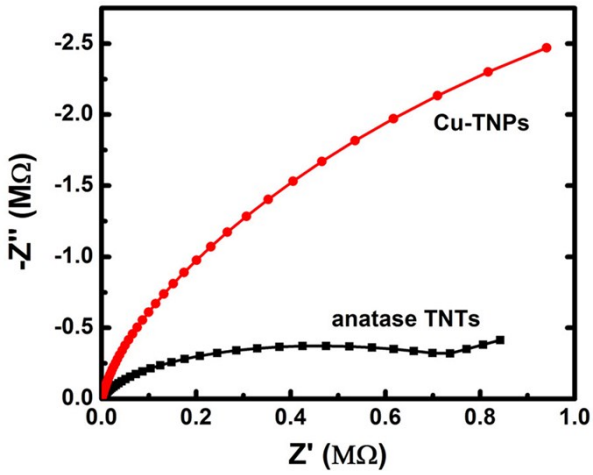


Fig. S4 Minus Nyquist plots of as-synthesized Cu-TNPs and anatase TNTs products from EIS measurements.

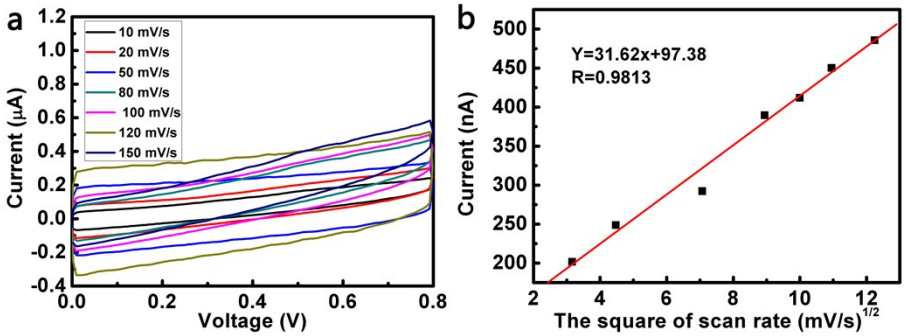


Fig. S5 (a) CV curves of Cu-TNPs in 0.1 M NaOH solution with different scan rates; (b) relationship between response currents and scan rates at +0.65 V.

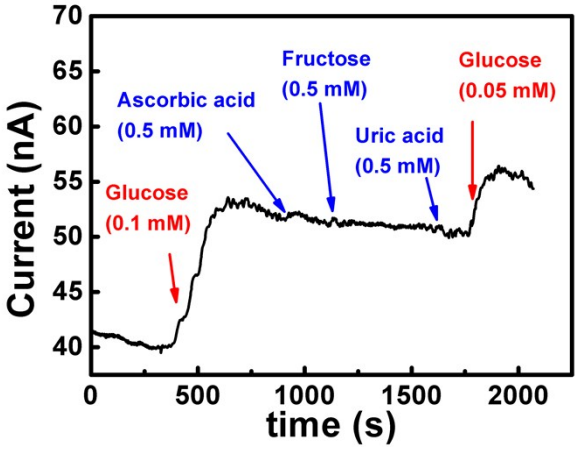


Fig. S6 Amperometric responses of the Cu-TNPs to the sequential addition of 0.1 mM glucose, 0.5 mM ascorbic acid, 0.5 mM fructose, 0.5 mM uric acid and 0.05 mM glucose.