Supporting information

An improved sensitivity non-enzymatic glucose sensor based on a CuO nanowire modified Cu electrode

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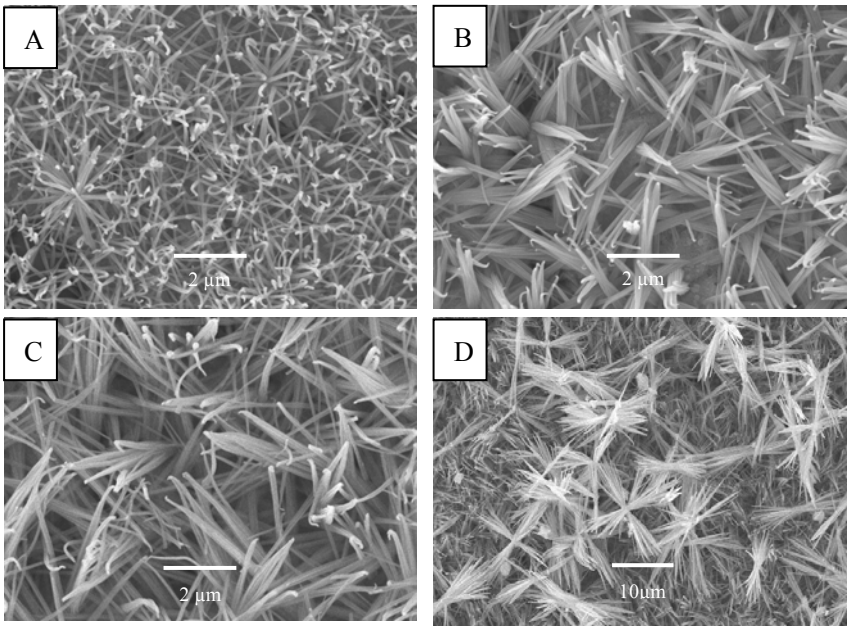

Fig. S1 SEM images of $Cu(OH)_2$ nanowires synthesised at different durations. (A) 30 s, (B) 2 min, (C) 20 min, and (D) 9 h. Scale bars: (A) 2 µm, (B) 2 µm, (C) 2 µm, and (D) 10 µm.

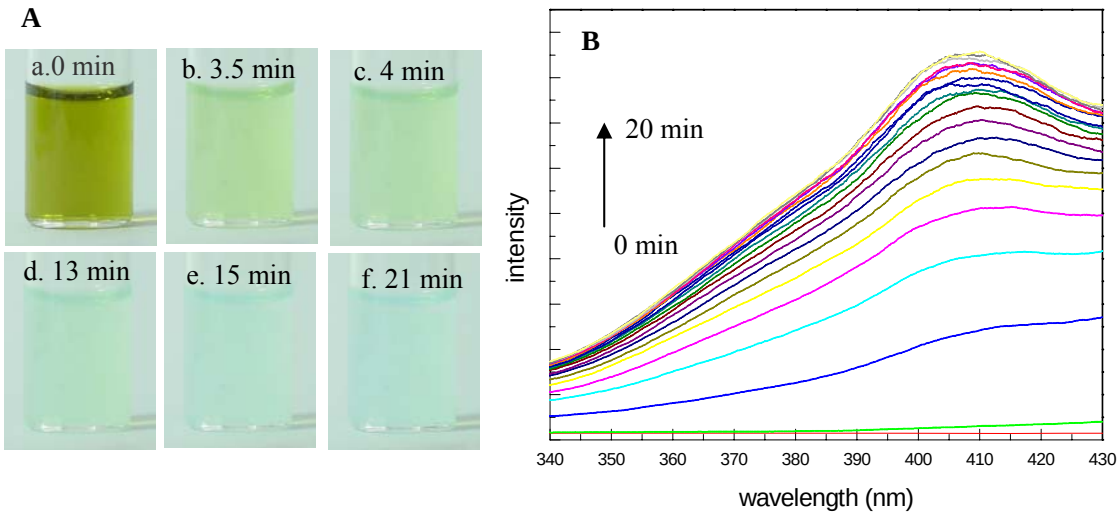

Fig. S2 (A) Photographs of the mixed solution of $CuSO_4$ aqueous solution and Na_2O_2 aqueous solution at different durations. (a) 0 min, (b) 3.5 min, (c) 4 min, (d) 13 min, (e)15 min, and (f) 21min. (B) Room-temperature fluorescence spectra of the mixed solution of $CuSO_4$ aqueous solution and Na_2O_2 aqueous solution at different durations.

Explanation the mechanism for the formation of $Cu(OH)_2$ nanowires on Cu substrate

A key point is that different growth speeds of the crystal faces determine the ultimate morphology First, it is well-known that the orthorhombic $Cu(OH)_2$ with a layered structure parallel to (010) consists of olated $Cu(OH)_2Cu$ chains oriented along [100] and characterised by the square-planar coordination of the Cu^{2+} by OH^- ions with strong $\sigma_{x2\text{-}y2}$ bonds. The layers are connected through H-bonding between the tetra-coordinated OH^- groups and two neighbouring bi-coordinated hydroxyls. The effect of O_2 produced by decomposition Na_2O_2 is perhaps to adsorb on the (010) surface, hindering the formation of hydrogen bond bridges, and thus, lowering the growth along the [010] direction.[29] Second, the growth of $Cu(OH)_2$ along [100] is much faster than along other directions and the [010] direction is the lowest growth direction, leading to a tendency of a wire-like structure.[34] As a result, a wire-like structure takes shape. As the reaction continued, the concentration of Na_2O_2 decreased and the driving force became weaker. When Na_2O_2 was exhausted entirely, the growth terminated and the length of $Cu(OH)_2$ nanowires remain unchanged even when the reaction time was extended (shown in Fig. S1D).

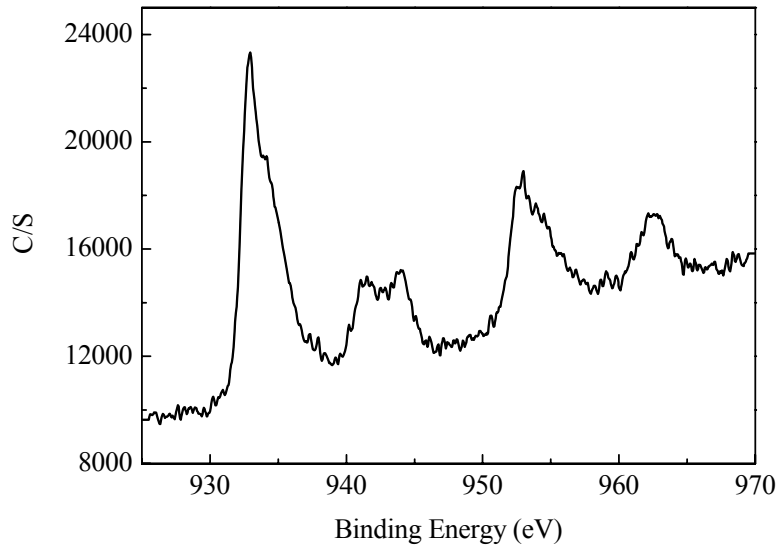

Fig. S3 XPS spectra of CuO nanowires grown on the Cu surface. X-ray photoelectron spectrum of CuO nanowires, showing Cu $2p_{3/2}$ and Cu $2p_{1/2}$ at 932.8 eV and 952.4 eV, respectively. The peakfit of Cu $2p_{3/2}$ peak revealed a main peak at 932.8 eV and accompanied by a series of satellites on the high binding energy side, 934.2, 940.9, and 943.5 eV respectively.(For the clearity, the peakfit was not shown in the figure)

Table S1 The sensitivity of the sensor at different applied potentials

Applied potential (V)	Sensitivity (μA/μmol·dm^{-3})
0.28	0.29
0.33	0.49
0.38	0.42
0.42	0.48