Supplementary information

Unconventional Synthesis of Cu-Au Dendritic Nanowires with Enhanced Electrochemical Activity

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Supplementary Figure S1 | Cu 2p XPS spectra of Cu-Au dendritic NWs, confirming the valence state of Cu.
Supplementary Figure S2 | SEM images of as-synthesized Cu-Au dendritic NWs with different surfactants. Anionic surfactant (a) sodium dodecyl sulfate (SDS), polymer surfactant (b) polyacrylic acid, (c) polyvinylpyrrolidone (PVP) and neutral surfactant (d) TritonX-100.
Supplementary Figure S3 | X-ray photoelectron spectra (XPS) and X-Ray Diffraction (XRD) patterns of Cu dendritic nanostructure. (a, b) XPS and (c) XRD pattern of the as-synthesized Cu dendritic nanostructure. (d) XRD pattern of the Cu NWs.
Supplementary Figure S4 | Confirm the valence state of Au. Au 4f XPS spectra of Au NWs.
Supplementary Figure S5 | TEM image of the as-synthesized Cu-Au dendritic NWs.

The arrows indicate broken Au NW bundles.
Supplementary Figure S6 | TEM images of the product after placing Cu NWs and Au NWs with surfactant for 2h at room temperature. (a). (b) High magnification TEM image of highlighted areas in (a).
**Supplementary Figure S7** Calculation of sensitivity of glucose detection with Cu-Au dendritic NWs modified electrode. (a) Cyclic voltamagrams (CVs) of Cu-Au dendritic structure in 5mM K$_3$Fe(CN)$_6$ with different scan rates from 0.05V~5V s$^{-1}$. (b) Plots of anodic and cathodic peak currents vs. square root of scan rate.

CVs in 5mM K$_3$Fe(CN)$_6$ were used to estimate electrochemically active surface area (ESA).
\[ \frac{i_p}{A} = (2.69 \times 10^5) \cdot n^{3/2} \cdot D_0^{1/2} \cdot C_0 \cdot v^{1/2} \] (1)

where \( i_p \), \( n \), \( D_0 \), \( C_0 \), \( v \) are oxidation or reduction peak current, electron transfer number, diffusion coefficient \((0.76 \times 10^{-5} \text{cm}^2 \text{s}^{-1})\), initial concentration of \( \text{K}_3\text{Fe(CN)}_6 \) \((5 \times 10^{-6} \text{mol cm}^{-3})\), and scan rate, respectively. \( A \) is ESA, calculated to be \(0.032 \text{cm}^2\).

Slope of the curve from Fig.5d of the main article divided by ESA gives the electrode calculated sensitivity of \(32.18 \mu \text{AMM}^{-1} \text{cm}^{-2}\).