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Development of Au-Pd@UiO-66-on-ZIF-L/CC as a self-supported electrochemical sensor for in situ monitoring of cellular hydrogen peroxide

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Results and Discussion

S1.1. Characterization

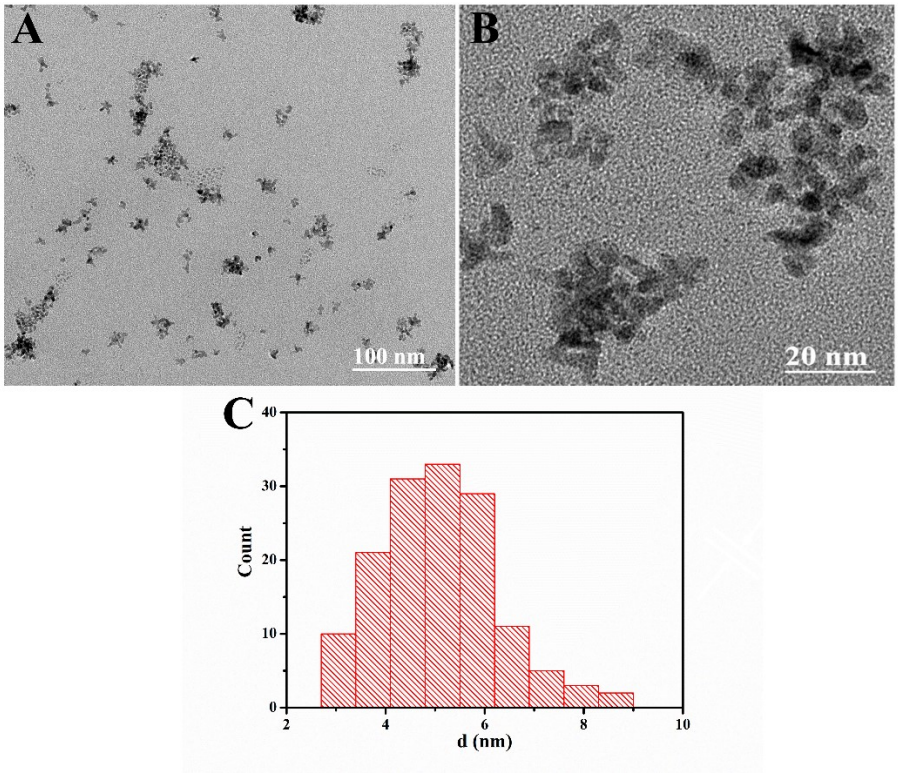

Fig. S1 (A and B) Transmission electron micrographs of Pd nanoparticles alone, and (C) Corresponding size histogram.

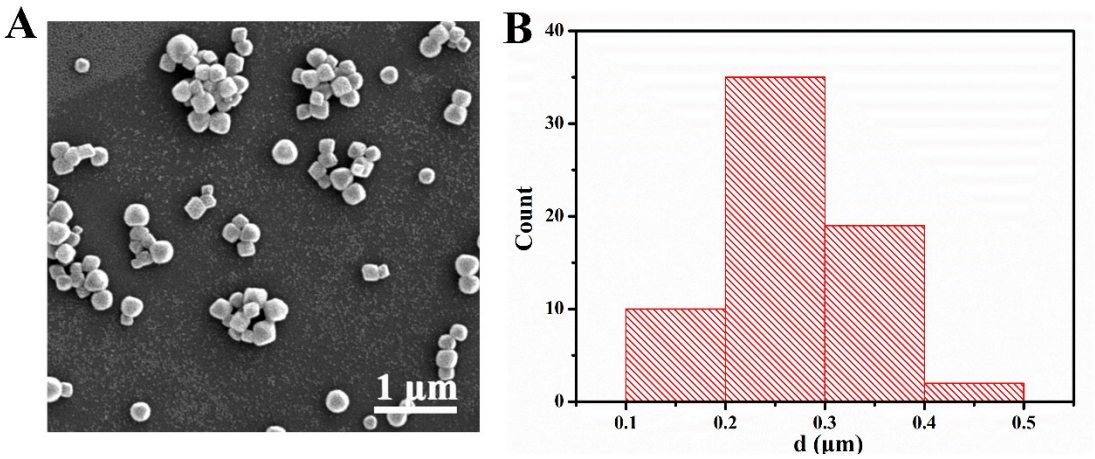

Fig. S2 (A) Field electron scanning electron micrograph of UiO-66, and (B) Corresponding size histogram.

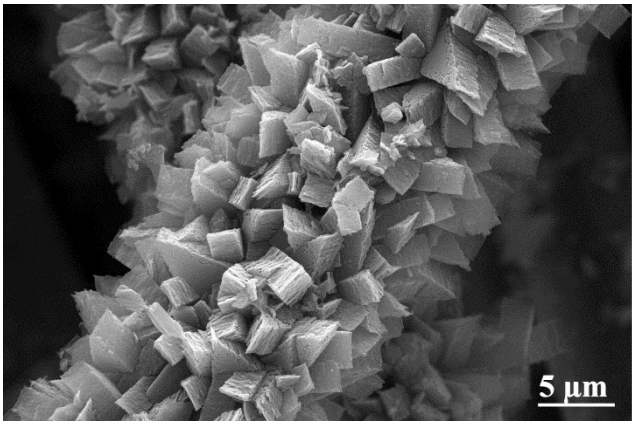

Fig. S3 Field emission scanning electron micrograph of ZIF-L/CC.

S1.2. Calculation method

For a reversible process (T=298K), the Randle Sevcik equation can be expressed as follows [1,2]:

$$I_p = (2.69 \times 10^5)\, n^{\frac{3}{2}} A\, D^{\frac{1}{2}}\, C\, v^{\frac{1}{2}}$$

where Ip is the anodic peak current, n is the number of transition electrons of $[Fe(CN)_6]^{3-/4-}$ (=1), A is the active surface area (cm^2), D refers to the diffusion coefficient (D=6.7 ± 0.02 $cm^2\ s^{-1}$), C means the concentration of $K_3Fe(CN)_6$ (5 mM), υ is the scan rate (50 mV s^{-1}).

S1.3. Sensitivity and Detection Limit Calculation

The sensitivity and detection limit of Au-Pd@UiO-66-on-ZIF-L/CC can be calculated by the following equation [2,3]:

$$Sensitivity = \frac{k}{A}$$

$$Detection\ limit = \frac{S}{N} \cdot \frac{\delta}{k}$$

where k refers to the slope of the regression line, A means the area of Au-Pd@UiO-66-on-ZIF-L/CC, S/N is the signal-to-noise ratio of electrochemical station and usually the

value is 3, δ is the standard deviation of response.

Table S1. Compared with other non-enzymatic electrochemical sensors for H_2O_2 detection.

electrode materials [a]	linear range (μM)	detection limit (μM)	references
Au/Fe_3O_4	1– 1000	0.108	[2]
Co-N/CNT	5×10^{-5} – 50,000	0.0324	[3]
Pt@UiO-66	5 – 14,750	3.06	[4]
Ag/H-ZIF-67	5–7000, 7000 – 67,000	1.1	[5]
Co@MOF-808	10 – 450	1.3	[6]
$ZnMn_2O_4$@rGO	0.03 – 6000	0.012	[7]
PB NPs/Ti_3C_2	0.6 – 63.6, 63.6 – 254	0.20	[8]
CoFe-PBA/Co-ZIF	200 – 6000	0.0108	[9]
Pd@UiO-66-on-ZIF-L	1 – 19,600	0.0212	This work

[a] N/CNT: N-doped carbon nanotube; rGO: reduced graphene oxide; PB: Prussian blue; NPs: nanoparticles; PBA: Prussian blue analogue.

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