Supporting Information

Plasma polyacrylic acid and hollow TiO_2 spheres modified with rhodamine B for sensitively electrochemical sensing Cu(II)

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1. EIS Nyquist plot and equivalent circuit

The EIS spectrum was analyzed using Zview2 software. A nonlinear least-squares method was used to fit and determine the parameters of the elements in an equivalent circuit (**Fig. S1**). The Randles equivalent circuit, which consists of solution resistance (R_s), charge-transfer resistance (R_{et}), constant-phase element (CPE), and Warburg impedance (W_o), is shown in the inset of **Fig. S1**.

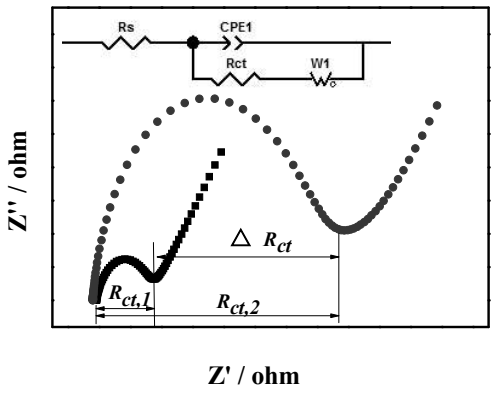

Fig. S1 EIS Nyquist plots and equivalent circuit

2. The FT-IR spectra of TiO_2@PPAA composite deposited at 20W

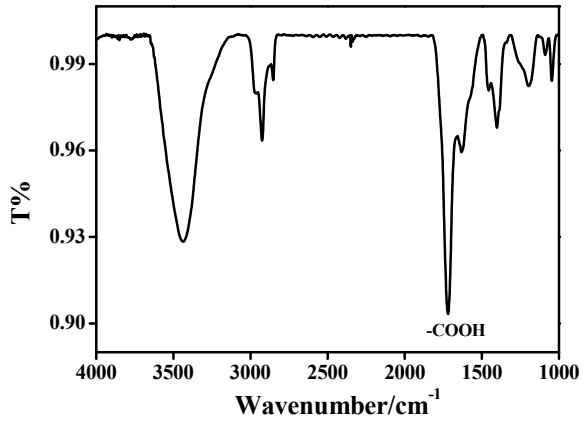

Fig. S2 FT-IR spectra of TiO_2@PPAA nanocomposites deposited at 20 W for 1 min

3. The XPS spectra of TiO_2@PPAA composite

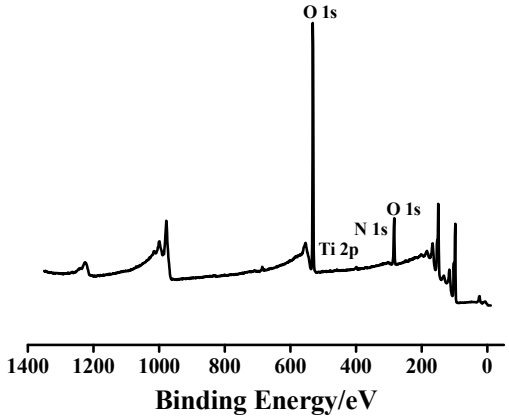

Fig. S3 The survey scan spectra of TiO_2@PPAA composite deposited at 20 W for 1 min

Table S1 Atomic percentage of TiO_2@PPAA composite for fabrication developed the sensor for detection of Cu^{2+}

Different steps	**Atomic %**		
	C 1*s*	O 1*s*	N 1s
TiO_2@PPAA	32.6	64.69	2.14
TiO_2@PPAA-EDC/NHS	69.92	13.13	16.95
TiO_2@PPAA-RhB	52.4	44.53	3.07

Table S2 The fitting values of the Randles Equivalent Circuit elements for the assembly process of *h*-TiO_2@PPAA-RhB electrochemical sensor before and after the detection of Cu^{2+}.

Modified electrodes	R_s**(Ω)**	R_{et}**(Ω)**	**CPE(μMho)/n**
Au	594.8	50.21	1.95/0.982
h-TiO_2/Au	583.6	139.9	3.76/0.839
h-TiO_2@PPAA/Au	533.3	426.8	5.52/0.80
h-TiO_2@PPAA-EDC-NHS/Au	533.2	354.2	66.38/0.563
h-TiO_2@PPAA-RhB/Au	546.5	797.2	4.491/0.80
h-TiO_2@PPAA-RhB-Cu^{2+}/Au	554.4	1510	2.415/0.857

4. The different developed sensor for detection Cu^{2+}

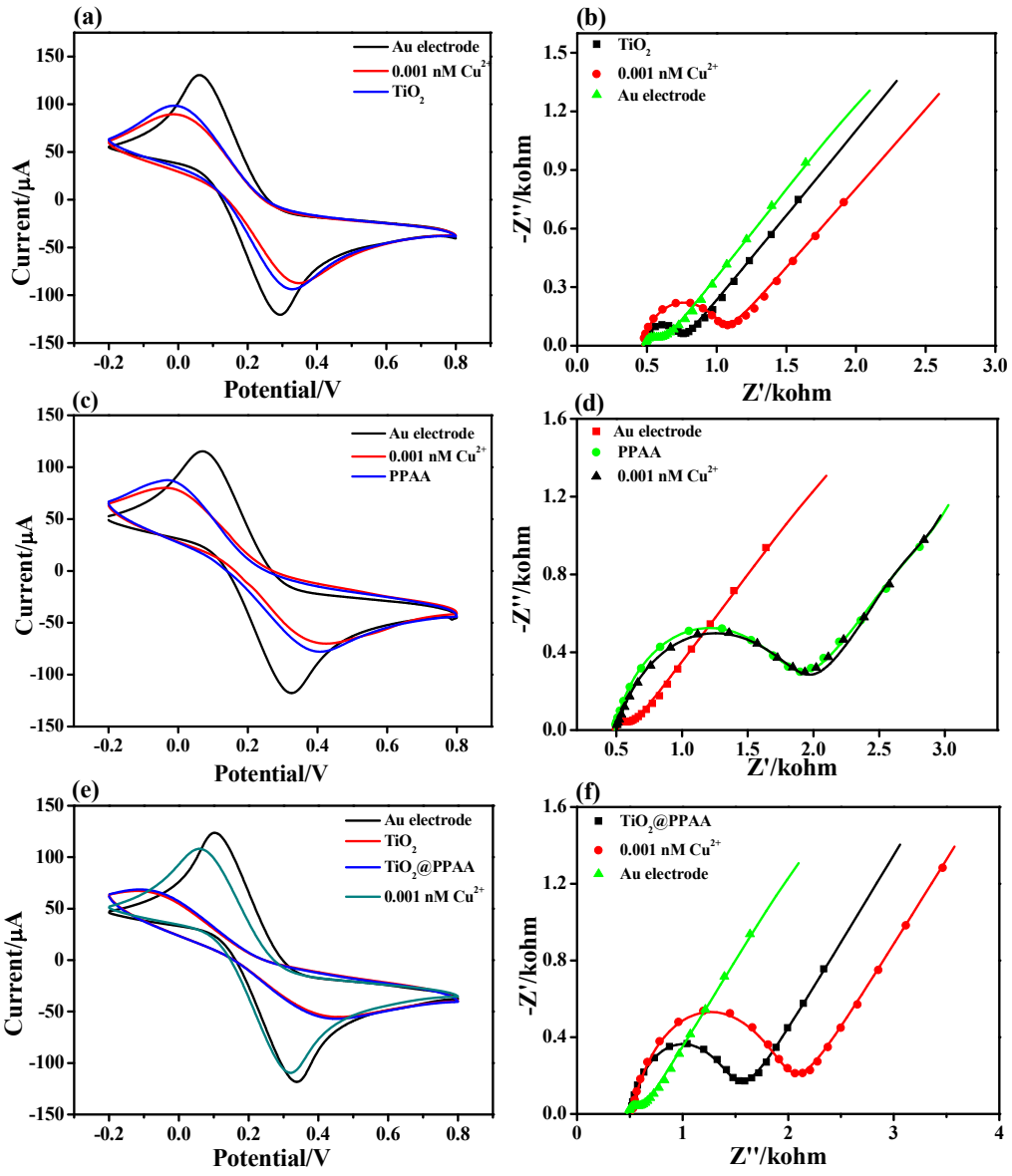

Fig. S4 CV and Nyquist plots of *h*-TiO_2/Au (a-b), PPAA/Au (c-d) and *h*-TiO_2@PPAA (e-f) for directly detection of 1 pM Cu^{2+}.

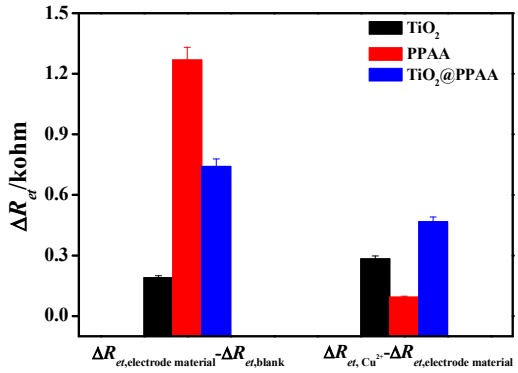

Fig. S5 The values of ΔR_{et} about the different modified electrodes with TiO_2, PPAA and TiO_2@PPAA toward the direct adsorption of Cu^{2+}, respectively.

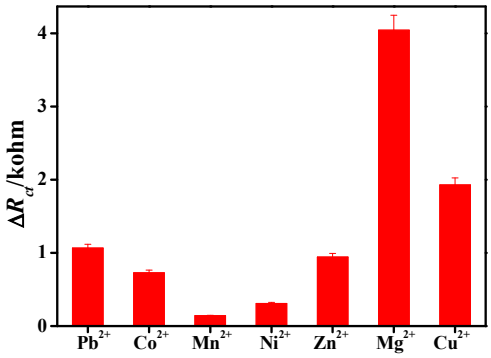

Fig. S6 The values of ΔR_{et} about the direct adsorption of Pb^{2+}, Co^{2+}, Mn^{2+}, Ni^{2+}, Zn^{2+}, Mg^{2+}, and Cu^{2+} using the TiO_2@PPAA nanofilm as the electrode materials.