Supporting Information

Isolatedly/interactedly Au islanded TiO_2 NTs for a switch of photocatalytic/photoelectrocatalyic degradation of refractory organic pollutants in wastewater

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1. Preparation of the two-step TiO_2 NTs

Titanium sheets (20mm×10mm×0.2mm) were ultrasonically cleaned by acetone, absolute ethyl alcohol, diluted hydrochloric acid and deionized water inturn for 15min and dried in air. Later, the cleaned Ti sheet was used as the anode and a Pt sheet (20 mm × 10 mm × 0.2 mm) was used as the cathode were put into the organic electrolyte which was made up with 0.5 wt-% NH_4F and 2 vol-% deionized water in ethylene glycol.

The first anodization was carried out at 60 V for 30 min (one-step TiO_2 NTs), after which the one-step TiO_2 NTs were immediately ultrasonically cleaned in deionized water，until the oxide film formed on the surface of the titanium sheet was completely cleaned, living glossy substrate with ordered hexagonal pattern. The second anodization was subsequently carried out under the same organic electrolyte at 30V for 30 min (the two-step TiO_2 NTs), washed by deionized water, and dried in a N_2 stream. In the end, the TNTs samples were calcined in muffle furnace at 450 ◦C for 1 h with a heating rate of 5 ◦C /min to transform the amorphous phase of TiO_2 to the anatase phase.

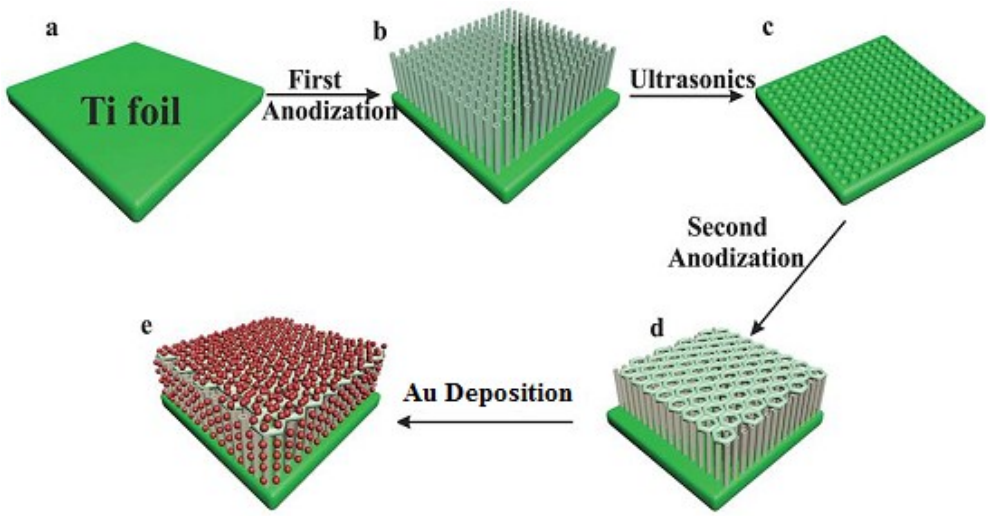

Fig.S1 Two-step anodization processes for fabrication of 2-step TiO_2 NTs and photocatalytic reduction for decoration of Au.

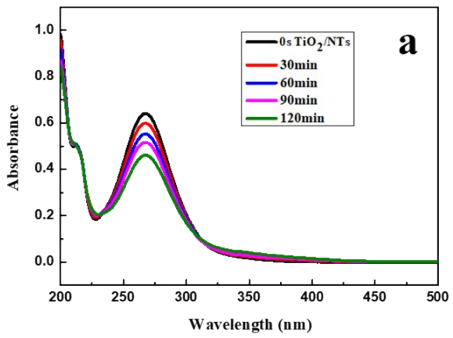

Fig.S2

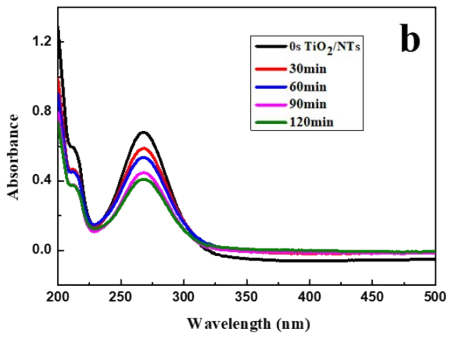

Fig.S3

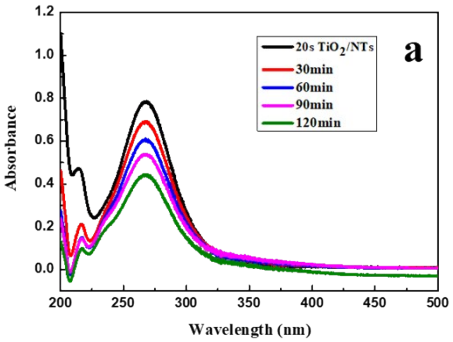

Fig.S4

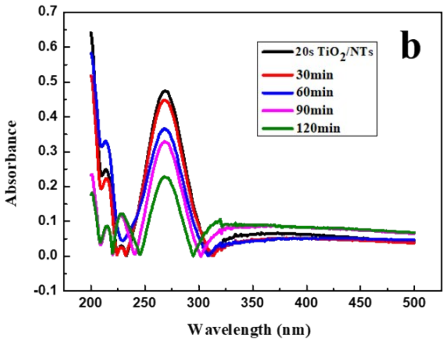

Fig.S5

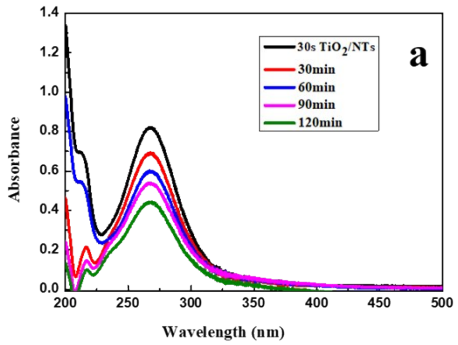

Fig.S6

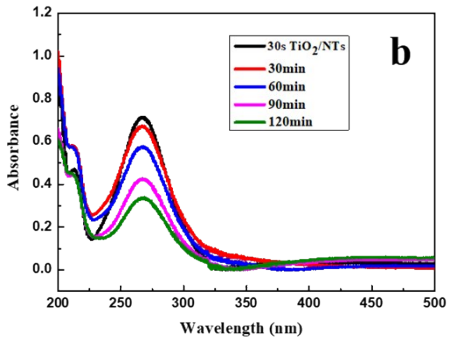

Fig.S7

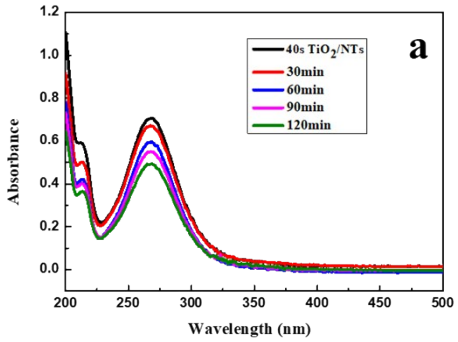

Fig.S8

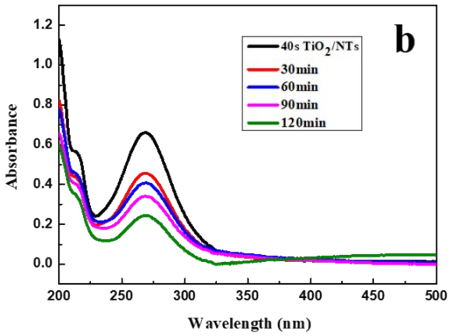

Fig.S9

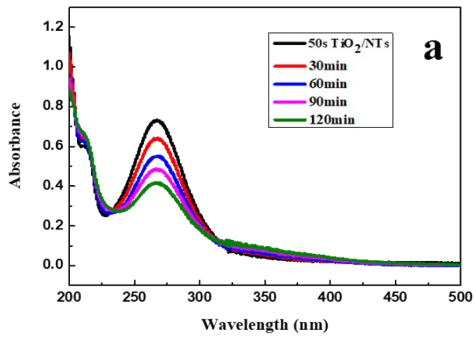

Fig.S10

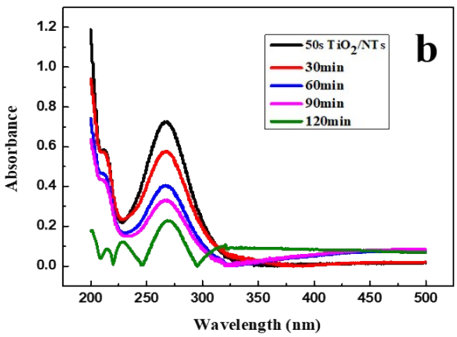

Fig.S11

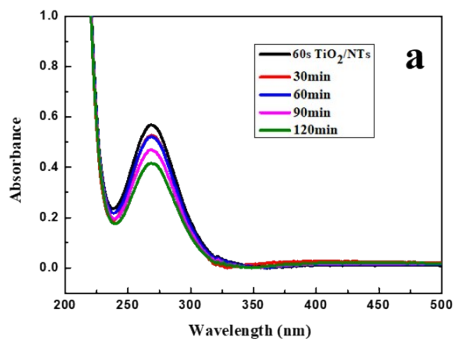

Fig.S12

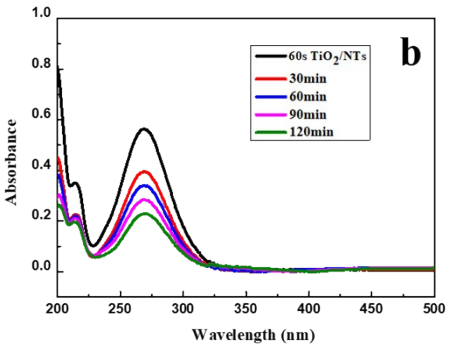

Fig.S13

(a) Photocatalytic performances of the Au/TiO_2 NTs degradation of NB under the irradiation of UV light after 2 h; (b) photoelectrocatalysis performances of the Au/TiO_2 NTs degradation of NB under the irradiation of UV light after 2 h;

Table S1 Mass fraction (%)of Au/TiO_2 NTs sprayed with different time

Samples	Ti	O	Au	C
TiO_2 NTs	45.63	49.84	0	4.53
20s Au/TiO_2 NTs	24.32	61.98	1.76	11.94
30s Au/TiO_2 NTs	25.72	62.35	1.77	10.16
40s Au/TiO_2 NTs	27.57	63.59	1.79	7.05
50s Au/TiO_2 NTs	24.40	67.22	1.83	6.55
60s Au/TiO_2 NTs	29.02	58.47	1.96	10.55