

## Supporting Information

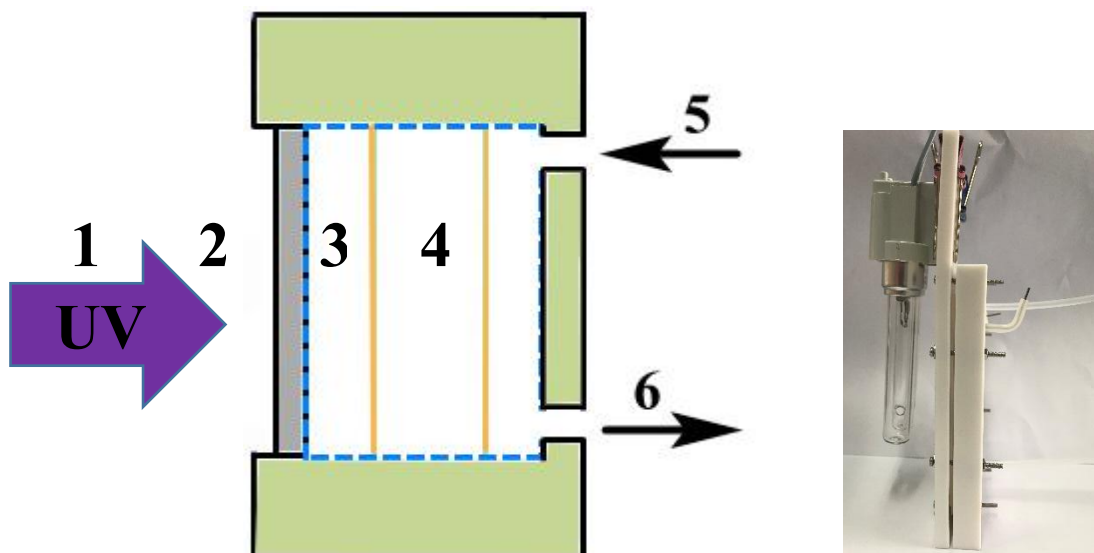
### **A simple flow injection sensing system for the real-time on-line determination of chemical oxygen demand based on 3D Au-NPs/TiO<sub>2</sub> nanotube arrays**

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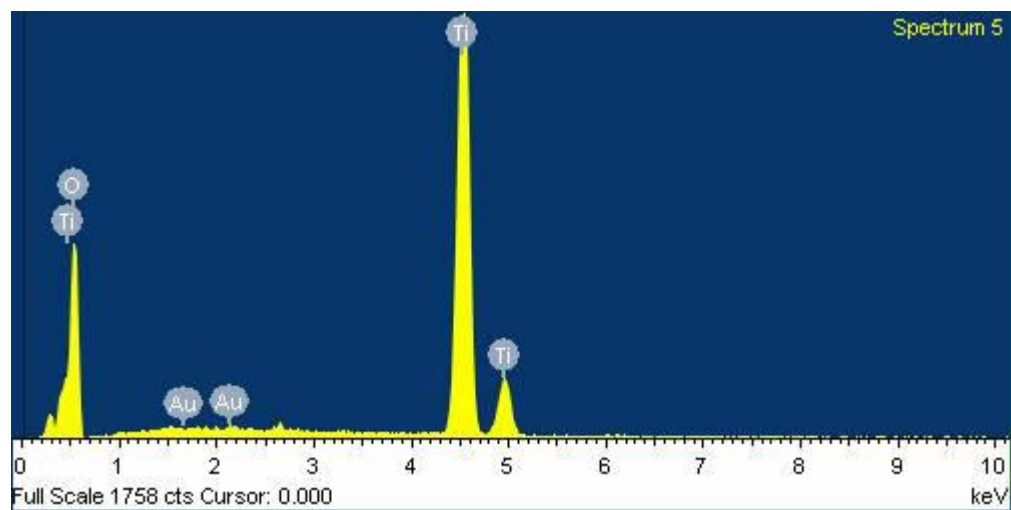
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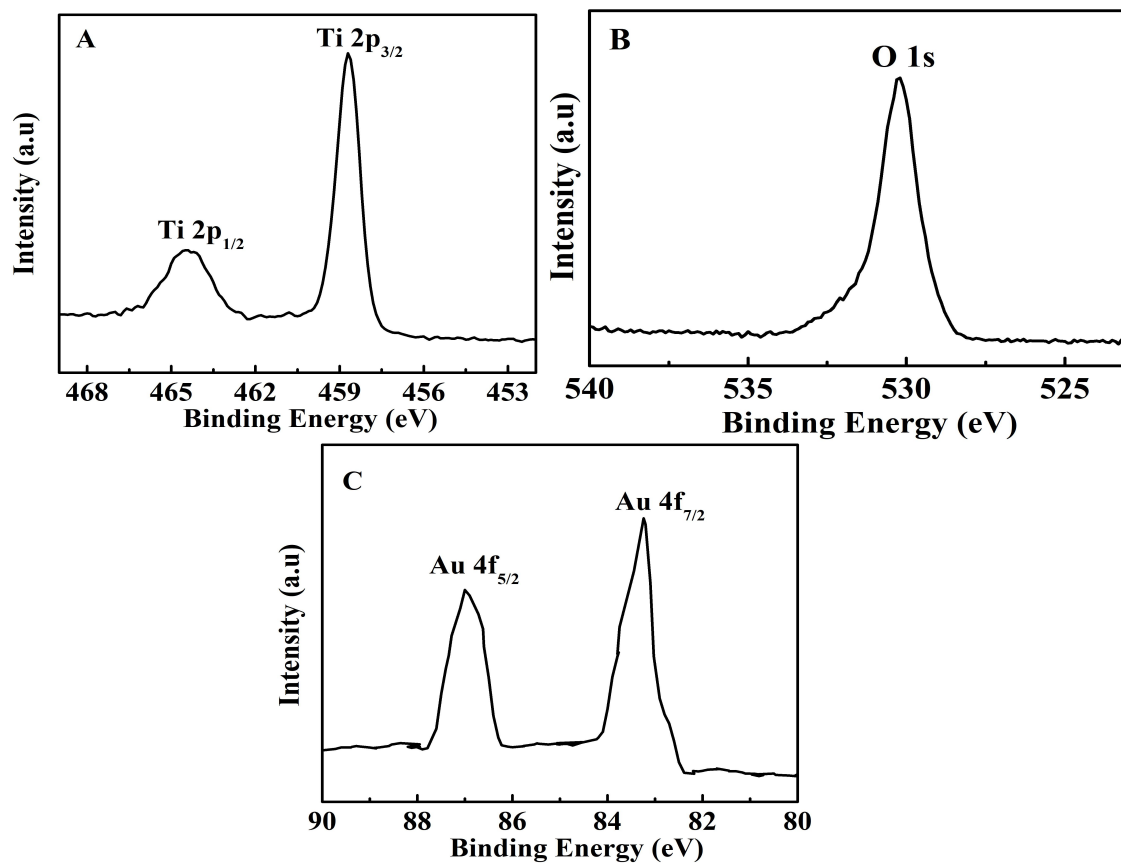
**Figure. S1.** Schematic diagram (left) and digital image (right) of continuous flow photoelectrochemical thin-layer cell for real-time on-line COD determination: 1) ultraviolet lamp, 2) quartz window, 3) 3D Pt-NPs/TNTAs/Ti working electrode, 4) Pt-NPs/Ti counter electrode, 5) flow inlet and 6) flow outlet.



**Figure. S2** The EDS spectrum of the 3D Au-NPs/TNTAs electrode.

**Table S1**-The effect of anodic time and calcination temperature on the saturated photocurrent density of 3D TNTAs of 50 meshes.

Sample No.	V (V)	t <sub>1</sub> (min)	T ( °C )	t <sub>2</sub> (h)	Crystal type	PD (mA/cm <sup>2</sup> )
1	60	10	350	3	A	0.134
<b>2</b>	<b>60</b>	<b>10</b>	<b>450</b>	<b>3</b>	<b>A</b>	<b>0.176</b>
3	60	10	550	3	A	0.172
4	60	10	650	3	A, R	0.130
5	60	20	350	3	A	0.112
6	60	20	450	3	A	0.128
7	60	20	550	3	A	0.103
8	60	20	650	3	A, R	0.008
9	60	30	350	3	A	0.082
10	60	30	450	3	A	0.029
11	60	30	550	3	A	0.034
12	60	30	650	3	A, R	0.001
13	60	60	350	3	A	0.021
14	60	60	450	3	A	0.050
15	60	60	550	3	A	0.031
16	60	60	650	3	A, R	0.0002



**Figure. S3.** XPS spectra of A Ti 2p and B O1s and C Au 4f states of Au-NPs/TiO<sub>2</sub> nanotube arrays.

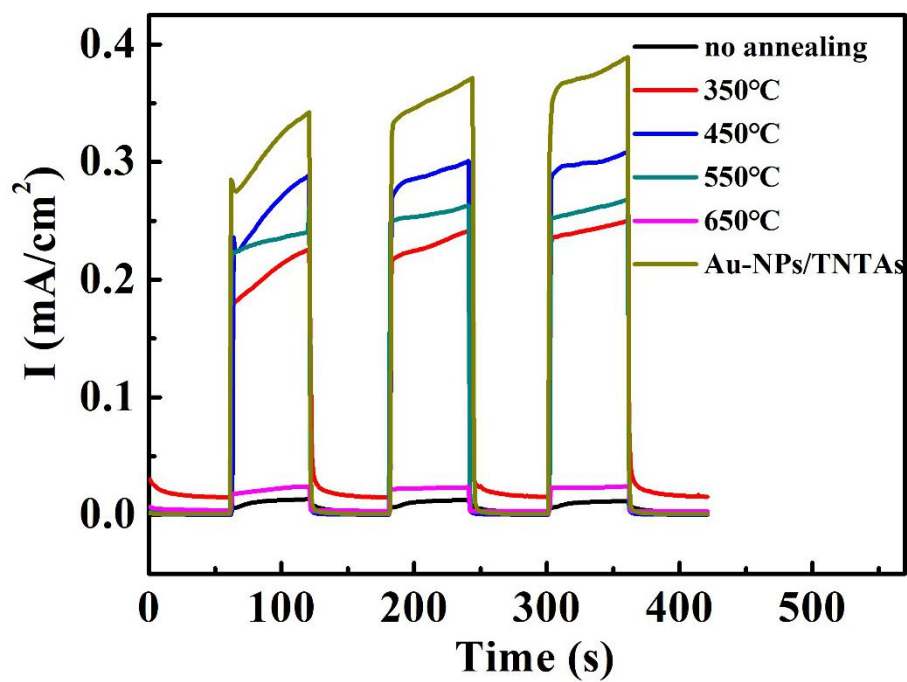


Fig. S4. Photocurrent response for the as-prepared samples in different annealing temperature in comparison to that of Au-NPs/TNTAs with an applied potential 1.5 V under UV illumination. 0.2 mM Na<sub>2</sub>SO<sub>4</sub> solution was used as the supporting electrolyte.