

# Synthesis of hollow sphere structured TiO<sub>2</sub> loaded with Ag<sub>2</sub>O and its photocatalytic activity

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## 1. Chemical composition of Ag<sub>2</sub>O/TiO<sub>2</sub> samples (EDS)

Table S1. The EDS results of Ag<sub>2</sub>O/TiO<sub>2</sub> samples

Samples	Content (at.%)				
	C	O	Ti	Ag	Ti:Ag
TiO <sub>2</sub>	20.06	54.16	25.78	-	-
Ag <sub>2</sub> O/TiO <sub>2</sub> -	4.05	59.19	20.52	16.24	1:0.79
Ag <sub>2</sub> O/TiO <sub>2</sub> -	7.13	51.40	18.27	23.20	1:1.27
Ag <sub>2</sub> O/TiO <sub>2</sub> -	5.50	35.28	12.40	46.81	1:3.78
Ag <sub>2</sub> O/TiO <sub>2</sub> -	4.65	27.15	5.94	62.25	1:10.48

## 2. Photodegradation of Phenol

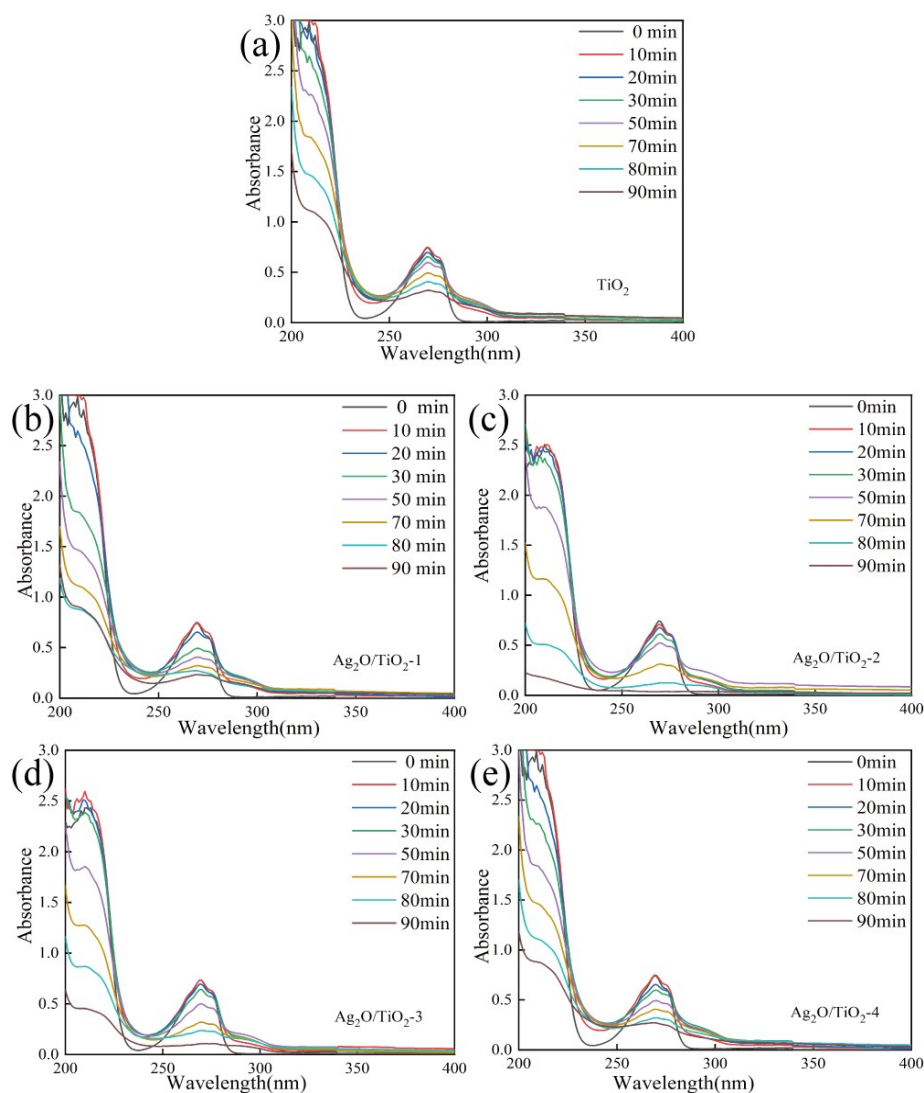


Fig. S1. UV-vis absorption spectra of phenol and reaction intermediates during degradation of Ag<sub>2</sub>O/TiO<sub>2</sub>

with different amounts of AgNO<sub>3</sub>: (a) TiO<sub>2</sub>, (b) Ag<sub>2</sub>O/TiO<sub>2</sub>-1, (c) Ag<sub>2</sub>O/TiO<sub>2</sub>-2, (d) Ag<sub>2</sub>O/TiO<sub>2</sub>-3, (e)

Ag<sub>2</sub>O/TiO<sub>2</sub>-4.

Ultraviolet-visible absorption spectra were obtained at different irradiation intervals, as shown in Fig. S1. As can be seen from the figure, with the extension of illumination time, the characteristic peak intensity of phenol gradually decreased,

indicating that phenol was gradually degraded under the action of catalyst. Meanwhile, new characteristic peaks were found at the wavelengths of 246 nm, 275 nm and 289 nm, and the peak intensity showed a trend of first increasing and then decreasing with the extension of illumination time. Under catalytic action, phenol is not directly degraded into CO<sub>2</sub> and H<sub>2</sub>O, but into intermediates *p*-Benzoquinone (246 nm), Catechol (275 nm) and Hydroquinone (289 nm).

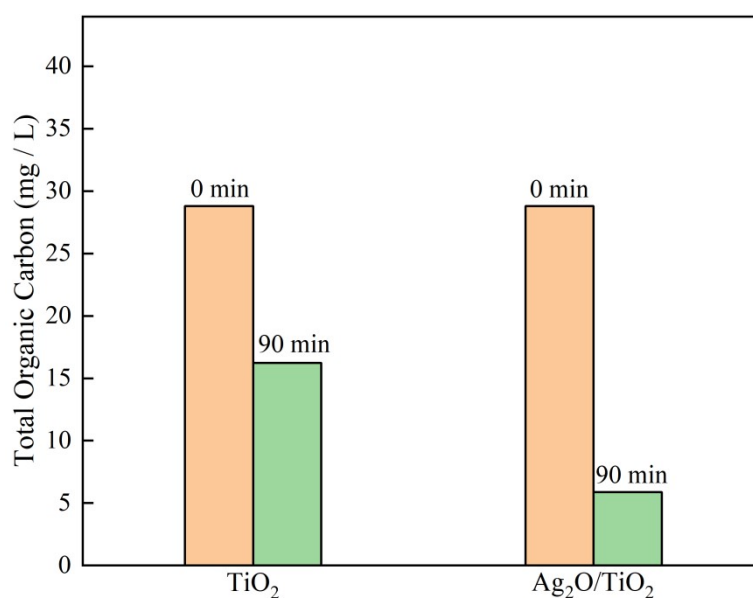


Fig. S2. Total organic carbon of phenol treated by TiO<sub>2</sub> and Ag<sub>2</sub>O@TiO<sub>2</sub>

The TOC of phenol solution has been determined using TiO<sub>2</sub> and Ag<sub>2</sub>O/TiO<sub>2</sub>-2 as catalysts, respectively. The results were shown in Fig. S2 in the supporting information. At the beginning, the TOC value of the initial phenol solution was 28.8 mg/L. After 90 min of irradiation, the TOC value decreased to 16.2 mg/L when using TiO<sub>2</sub> as catalyst. When using Ag<sub>2</sub>O/TiO<sub>2</sub>-2 as the catalyst, the TOC value decreased to 5.9 mg/L. The total organic carbon degradation rate was 43.6% and 79.6%,

respectively.

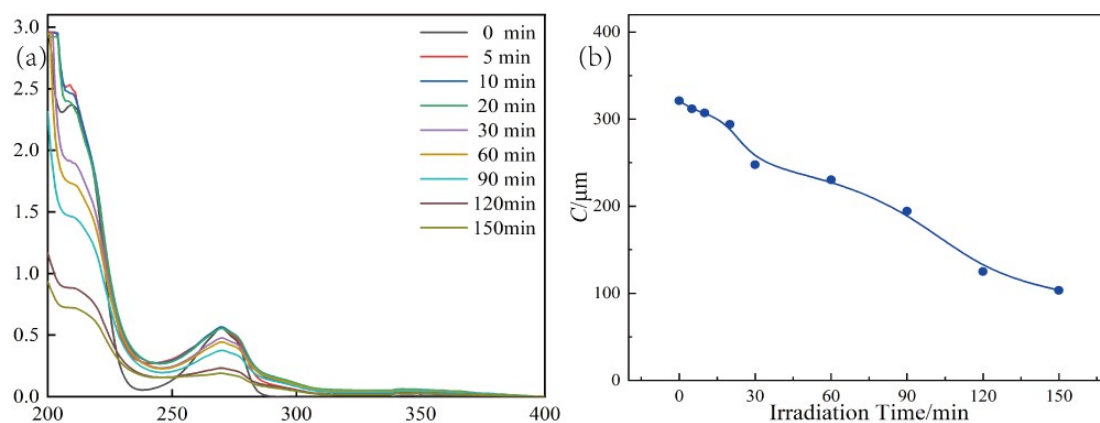


Fig. S3. Degradation of phenol by  $\text{Ag}_2\text{O}/\text{TiO}_2\text{-2}$  in visible light

We have conducted the photodegradation of phenol under visible light using  $\text{Ag}_2\text{O}/\text{TiO}_2\text{-2}$  as catalyst, as shown in Fig. S3. The photodegradation rate of phenol reached 39.5%, which was much lower than that of phenol under UV light irradiation.