

# **Supplementary Information**

*Article*

## **Cobalt Impregnation on Titania Photocatalysts Enhances Vis Phenol Photodegradation**

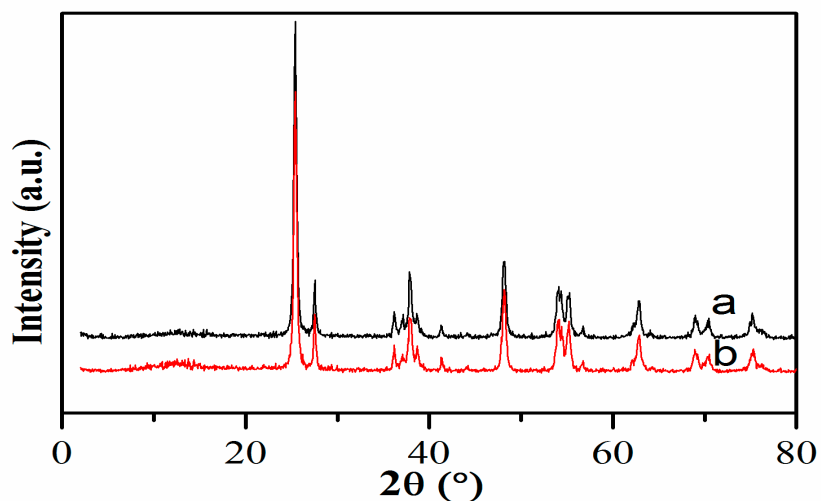
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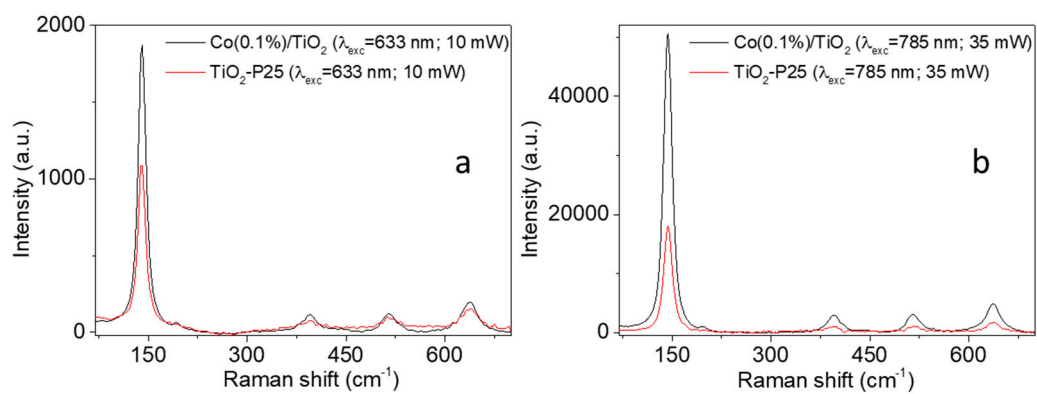
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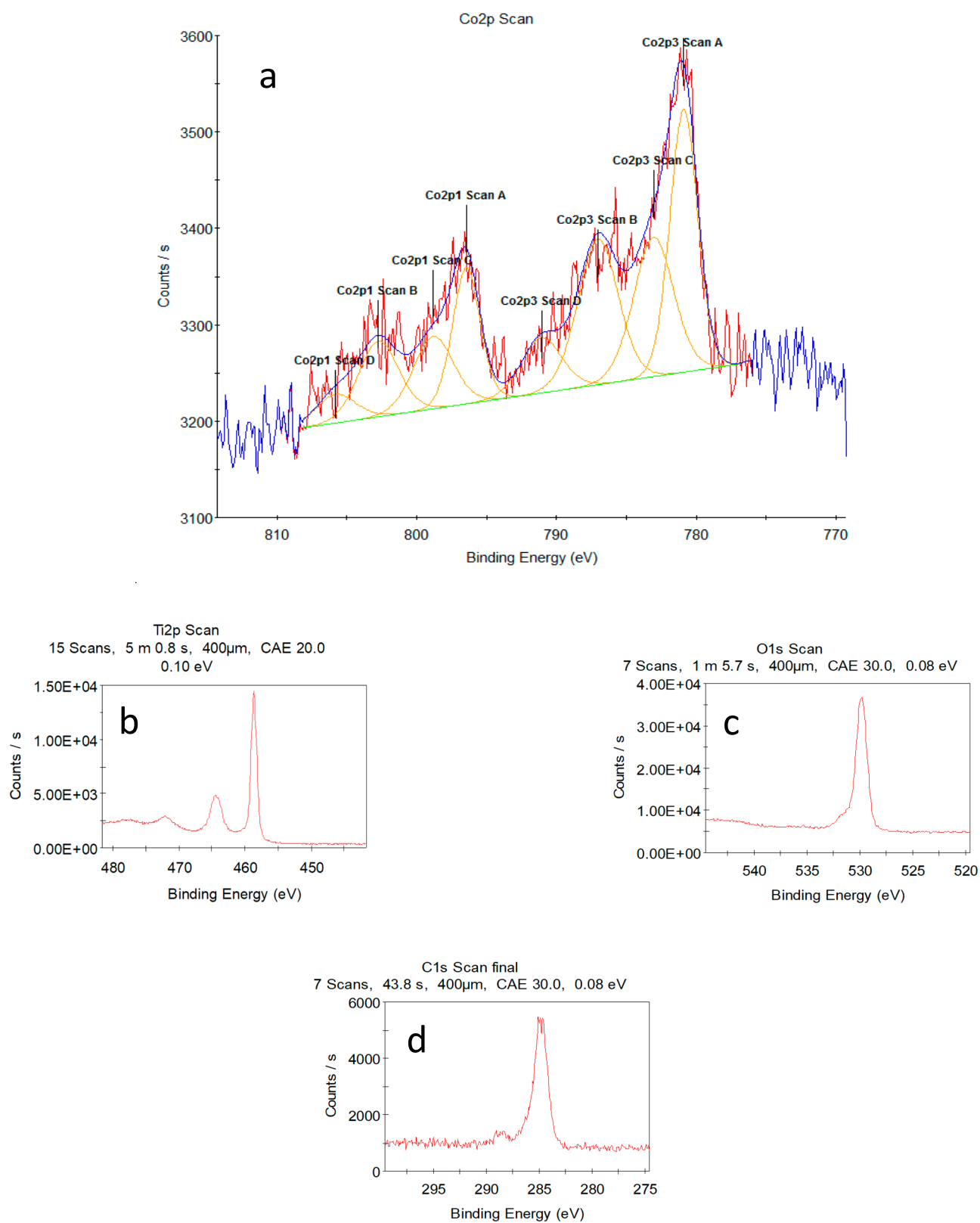
**Figure S1.** Diffractograms of Co(0.1%)/TiO<sub>2</sub>, a: before leaching test, b: after leaching test.

**Table S1:** Raman peak centred at 143 cm<sup>-1</sup> as a function of laser line and laser's power.

<i>Laser power</i>	<i>Laser line</i>	<b>633 nm</b>		<b>785 nm</b>	
	<i>Photocatalyst</i>	<b>P25</b>	<b>Co(0.1%)/TiO<sub>2</sub></b>	<b>P25</b>	<b>Co(0.1%)/TiO<sub>2</sub></b>
<b>21-28 mW</b>	<i>Peak position (cm<sup>-1</sup>)</i>	141	141	144	144
	<i>Height (CCD cts)</i>	10160	12954	9620	18381
	<i>FWHM (cm<sup>-1</sup>)</i>	4.34	19.7	14.1	14.4
<b>10 mW</b>	<i>Peak position (cm<sup>-1</sup>)</i>	141	141	n.a.	n.a.
	<i>Height (CCD cts)</i>	1304	2250	n.a.	n.a.
	<i>FWHM (cm<sup>-1</sup>)</i>	15.07	15.63	n.a.	n.a.
<b>35 mW</b>	<i>Peak position (cm<sup>-1</sup>)</i>	n.a.	n.a.	144	144
	<i>Height (CCD cts)</i>	n.a.	n.a.	15831	45907
	<i>FWHM (cm<sup>-1</sup>)</i>	n.a.	n.a.	13.9	14.0



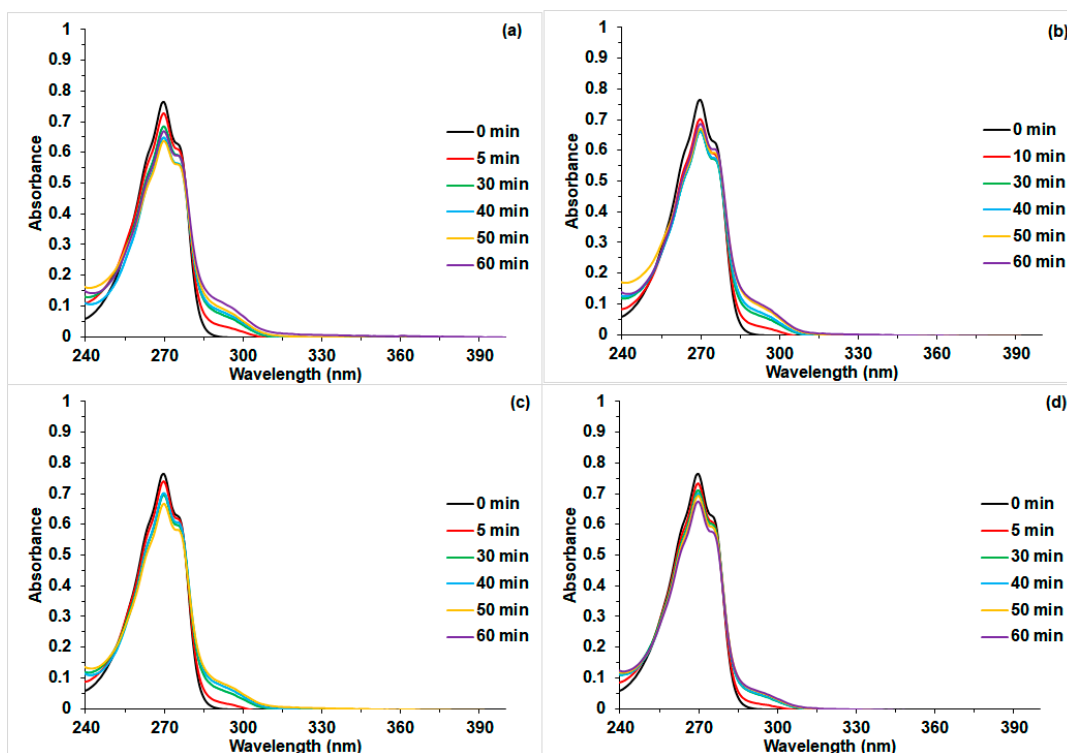
**Figure S2:** Raman spectra of  $\text{TiO}_2\text{-P25}$  and  $\text{Co}(0.1\%)/\text{TiO}_2$  acquired using (a) 633 nm and (b) 785 nm excitation laser line.



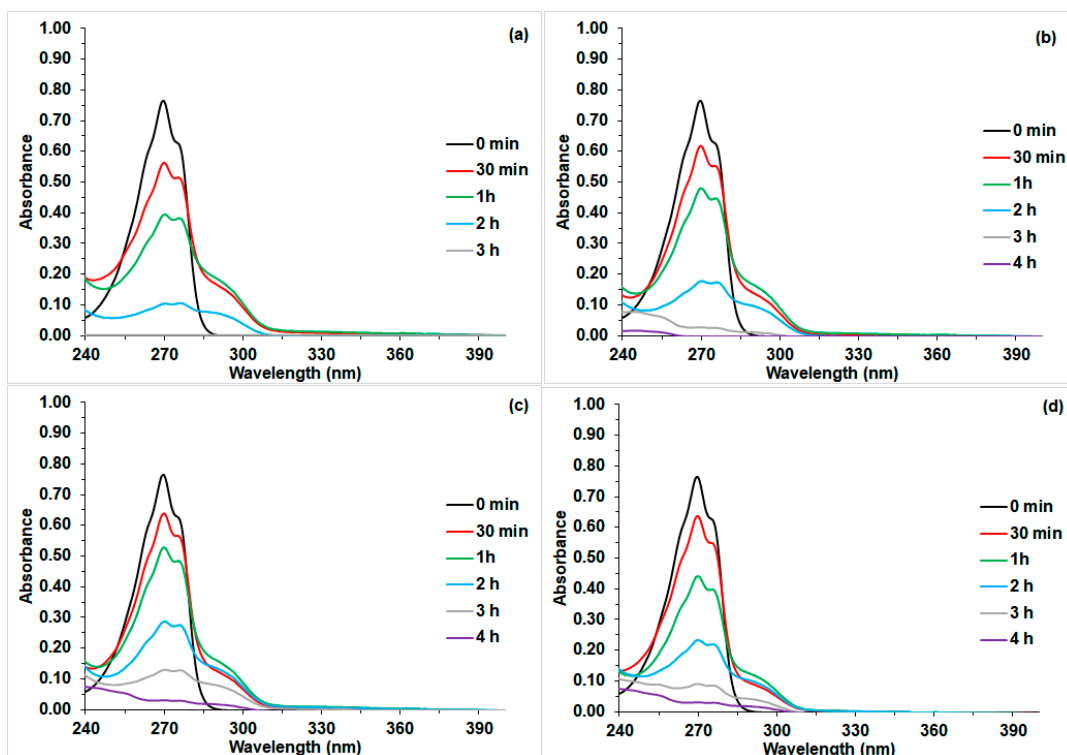
**Figure S3.** XPS spectra (a) Co 2p scan and fitting; (b) Ti 2p scan; (c) O 1s scan; (d) C 1s scan.

**Table S2:** Band gap for TiO<sub>2</sub>-P25 and Co doped TiO<sub>2</sub> photocatalysts synthesized by different methods.

Photocatalyst	Co (%wt)	Synthetic method	Band gap (eV)	Reference (DOI)
TiO <sub>2</sub> -P25	--	--	3.30	This work
Co/TiO <sub>2</sub>	0.1	Impregnation	2.4	This work
Co/TiO <sub>2</sub>	0.1	Sol-gel	2.66	10.1007/s10971-015-3715-3
Co/TiO <sub>2</sub>	0.1	Sol-gel	2.77	10.3390/ma11101946
Co/TiO <sub>2</sub>	0.1	Coprecipitation	2.78	10.1016/j.matchemphys.2012.04.062
Co/TiO <sub>2</sub>	0.3	Impregnation	2.3	This work
Co/TiO <sub>2</sub>	0.3	Sol-gel	3.00	10.5004/dwt.2017.20205
Co/TiO <sub>2</sub>	0.5	Impregnation	2.3	This work
Co/TiO <sub>2</sub>	0.5	Sol-gel	2.48	10.1016/j.sajce.2017.10.001
Co/TiO <sub>2</sub>	0.5	Hydrothermal	3.19	10.1016/j.apcatb.2016.03.003 1-s2.0-S0926337316301692-main
Co/TiO <sub>2</sub>	0.5	Sol-gel & Precipitation	3.24	10.1016/j.chemosphere.2020.128931
Co/TiO <sub>2</sub>	0.67	Sol-gel	3.02	10.1016/j.jwpe.2017.02.015 1-s2.0-S2214714416305256-main
Co/TiO <sub>2</sub>	1.0	Impregnation	2.3	This work
Co/TiO <sub>2</sub>	1.0	Sol-gel	1.97	10.1007/s10971-015-3715-3
Co/TiO <sub>2</sub>	1.0	Hydrothermal	3.13	10.1016/j.apcatb.2016.03.003 1-s2.0-S0926337316301692-main
Co/TiO <sub>2</sub>	1.0	Sol-gel & Precipitation	3.05	10.1016/j.chemosphere.2020.128931



**Figure S4:** Time-resolved UV-Vis spectra of phenol during its UV irradiation in the presence of (a) Co(0.1%)/TiO<sub>2</sub>, (b) Co(0.3%)/TiO<sub>2</sub>, (c) Co(0.5%)/TiO<sub>2</sub>, (d) Co(1%)/TiO<sub>2</sub>. [Phenol] = 50 ppm; Photocatalysts = 1 g·L<sup>-1</sup>, T *ca.* 25°C, natural pH.



**Figure S5:** Time-resolved UV-Vis spectra of phenol during Vis irradiation in the presence of (a) Co(0.1%)/TiO<sub>2</sub>, (b) Co(0.3%)/TiO<sub>2</sub>, (c) Co(0.5%)/TiO<sub>2</sub>, (d) Co(1%)/TiO<sub>2</sub>. [Phenol] = 50 ppm; Photocatalyst = 1 g·L<sup>-1</sup>, T *ca.* 25°C, natural pH.