

**Construction of spindle structure CeO₂ modified with rodlike
attapulgite as a high-performance photocatalyst for CO₂ reduction**

Jia Zheng^a, Zhi Zhu^b, Ge Gao^a, Zhi Liu^{*a}, Yongsheng Yan^b

- a. Faculty of Chemistry and Chemical Engineering, Liaoning Normal University, Dalian 116029, P.R. China
- b. Institute of the Green Chemistry and Chemical Technology, School of Chemistry and Chemical Engineering, Jiangsu University, Zhen Jiang 212000, P.R. China

*Corresponding authors:

E-mail address: zhiliu@lnnu.edu.cn

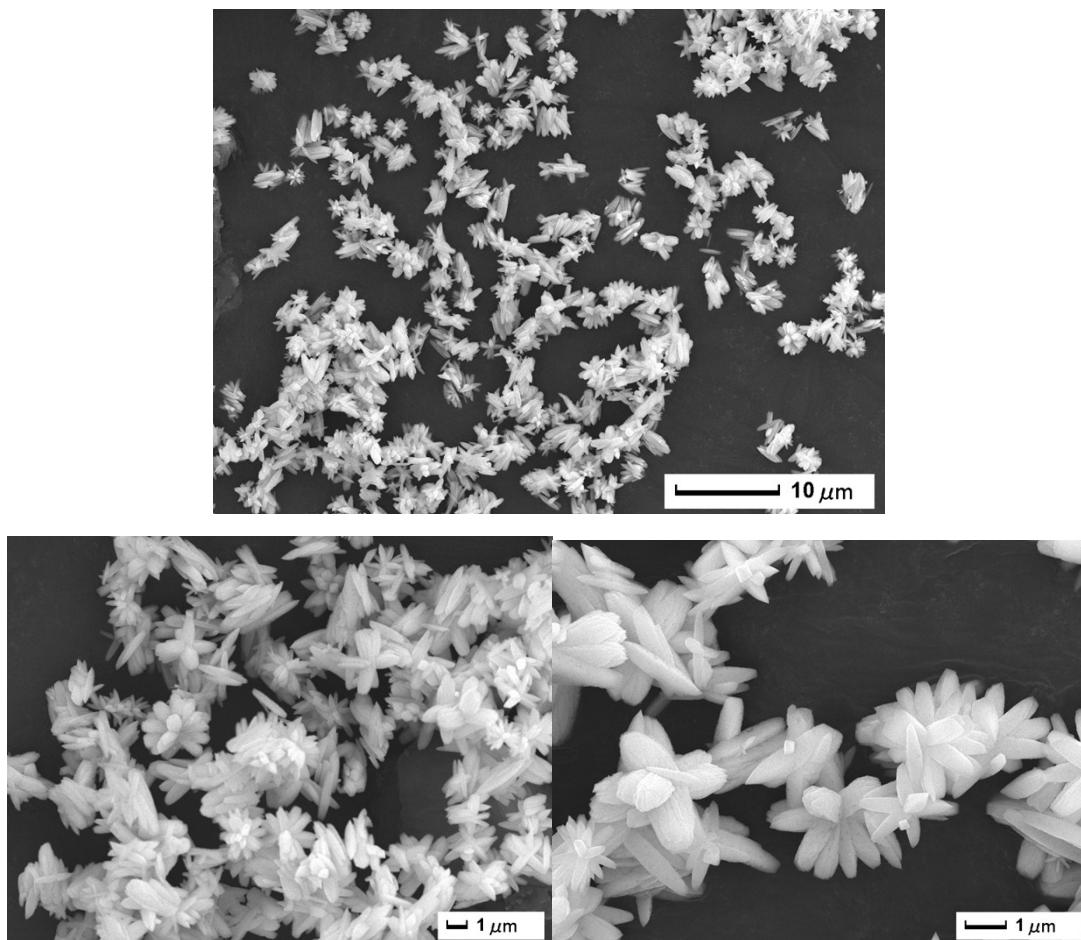


Fig. S1 SEM images of CeO₂.

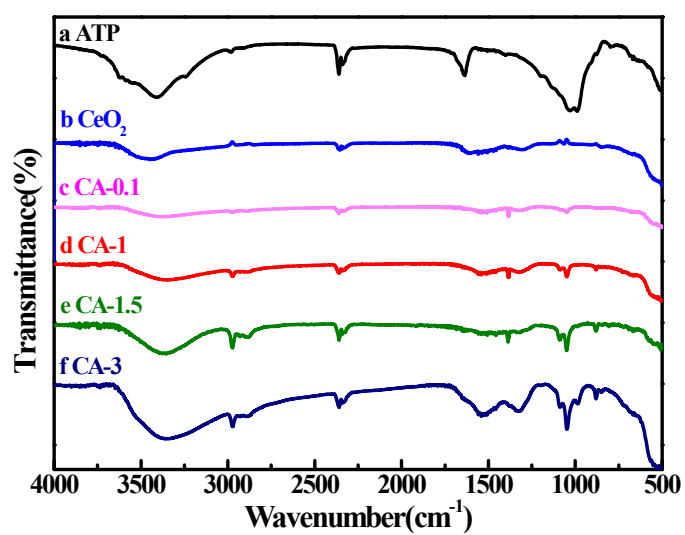
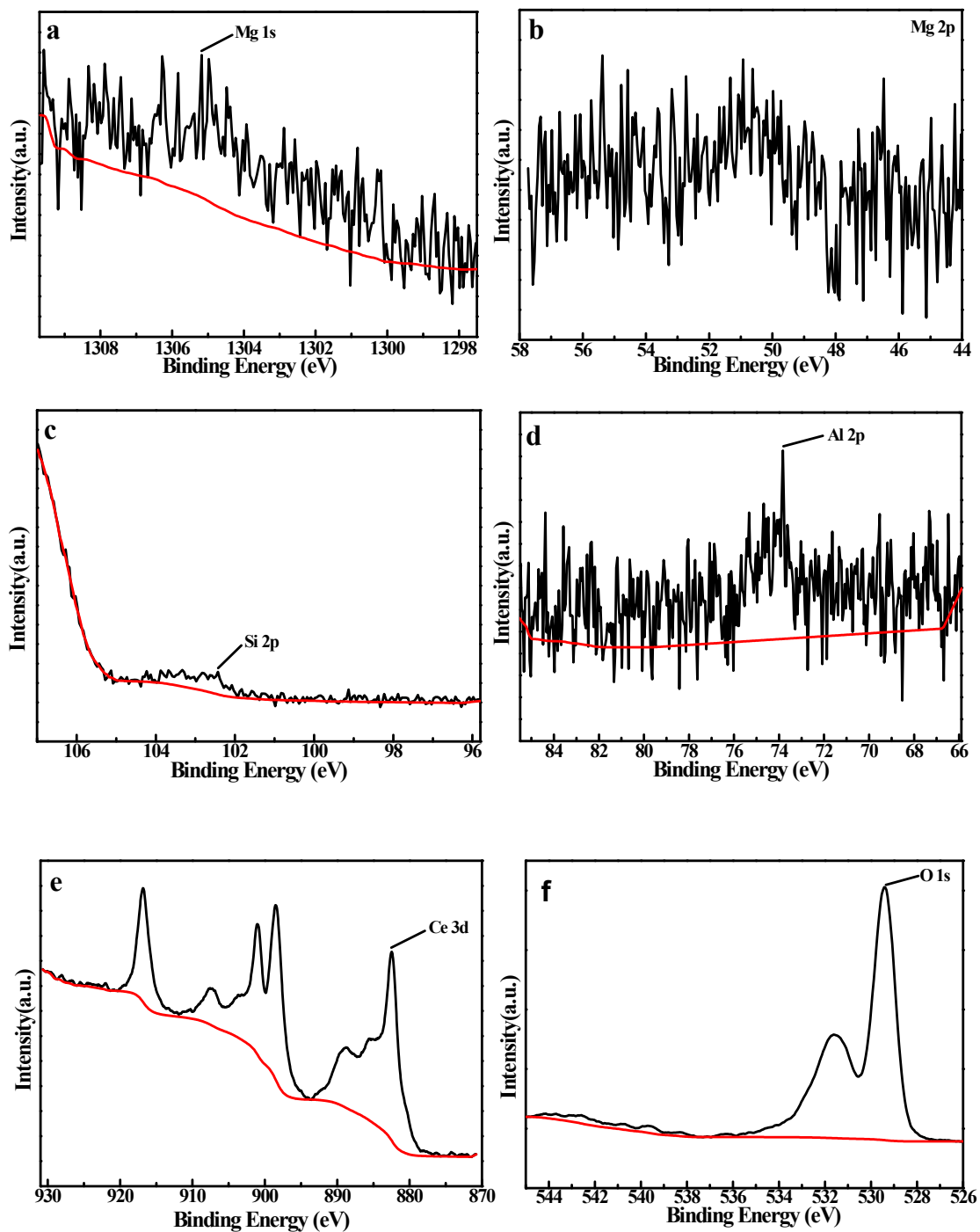


Fig. S2 FT-IR spectrum of (a) ATP, (b) CeO₂, (c) CA-0.1, (d) CA-1, (e) CA-1.5, (f) CA-3.

Table. S1 The BET and pore volume analysis of CeO₂ and CA-1.

Sample	Pore volume (cm ³ g ⁻¹)	Average pore diameter (nm)	S _{BET} (m ² g ⁻¹)
CA-1	0.1108	5.3173	101.4
CeO ₂	0.0504	2.9592	82.8



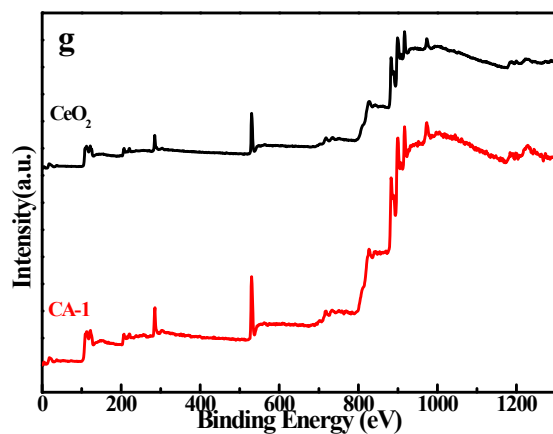


Fig. S3 XPS spectra of the of as-prepared CA-1: (a) Mg 1s spectrum, (b) Mg 2p spectrum, (c) Si 2p spectrum, (d) Al 2p spectrum, (e) Ce 3d spectrum, (f) O 1s spectrum, (g) survey spectrum.

Table. S2 Time-resolved fluorescence calculated average lifetimes of CeO₂ and CA-1.

Sample	A ₁	τ ₁	A ₂	τ ₂	τ
CA-1	51.05	1.28	19.39	5.47	2.43
CeO ₂	20.52	6.17	227.54	1.01	1.44

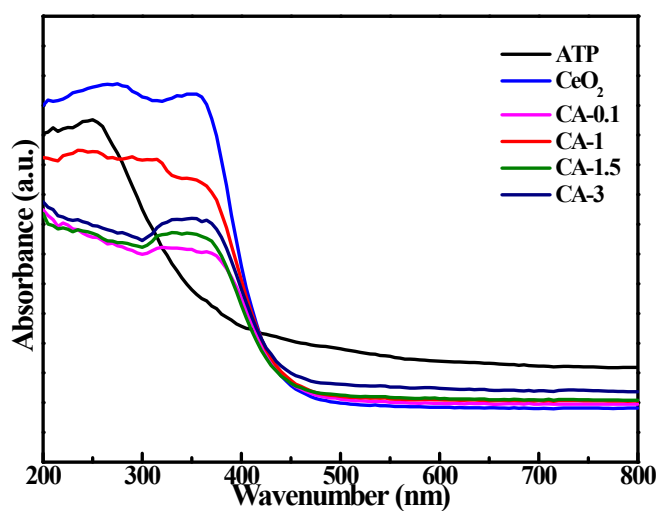


Fig. S4 UV-vis absorption spectra of ATP, CeO₂, CA-0.1, CA-1, CA-1.5, CA-3.