Supporting information

Flux Synthesis of Regular Bi_4TaO_8Cl Square Nanoplates Exhibiting Dominant Exposure Surfaces of {001} Crystal Facets for Photocatalytic Reduction of CO_2 into Methane

Liang Li,[b,c] *Qiutong Han,*[b,c] *Lanqin Tang,*[b,c,d] *Yuan Zhang,*[b,c] *Ping Li,*[b,c] *and Yong Zhou,*[a,b,c,e*] *Zhigang Zou*[b,c]

[a] Key Laboratory of Modern Acoustics (MOE), Institute of Acoustics, Department of Physics, Nanjing University, Nanjing 210093, P. R. China.

E-mail: zhouyong1999@nju.edu.cn

[b] School of Physics, National Laboratory of Solid State Microstructures, Collaborative Innovation Center of Advanced Microstructures, Nanjing University, Nanjing 210093, P. R. China

[c] Eco-Materials and Renewable Energy Research Center (ERERC), Nanjing University, Nanjing , 210093, P. R. China

[d] College of Chemistry and Chemical Engineering, Yancheng Institute of Technology, Yancheng 22401, P. R. China

e kunshan Sunlaite New Energy Co. Ltd., Kunshan Innovation Institute of Nanjing University, Kunshan, Jiangsu 215347, P. R. China

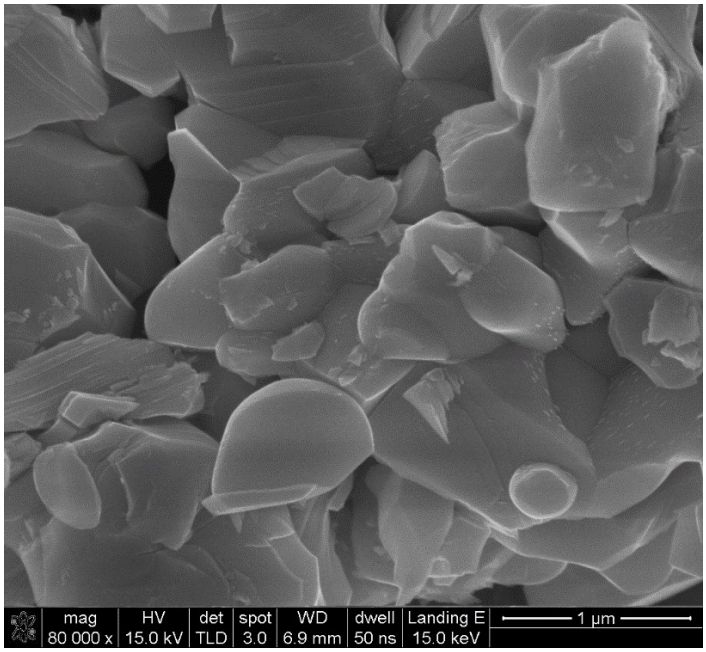
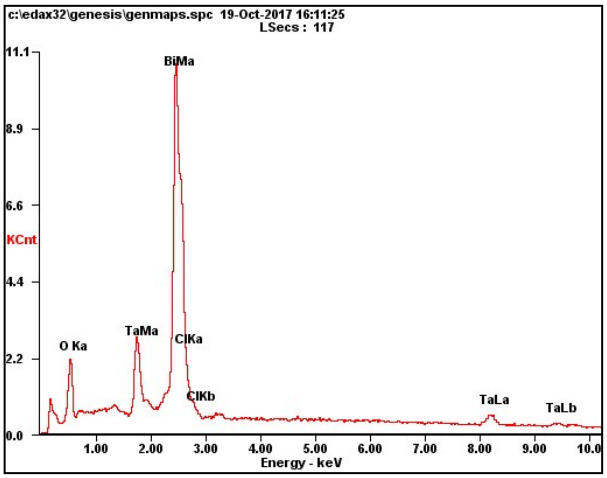


Figure S1. Typical SEM image of Bi_4TaO_8Cl-SSR.



Element	Wt%	At%
OK	13.45	62.24
BiM	68.86	24.40
ClK	03.66	07.62
TaL	14.03	05.74
Matrix	Correction	ZAF

Figure S2. EDS spectrum of the sample Bi_4TaO_8Cl-750 and its corresponding atomic ratio between O, Bi, Cl and Ta.

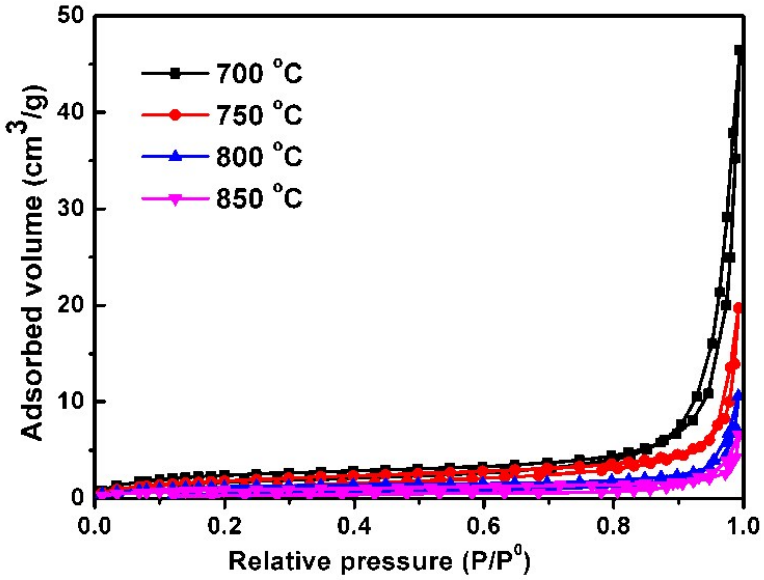


Figure S3. Typical N_2 adsorption plots of as-prepared samples.

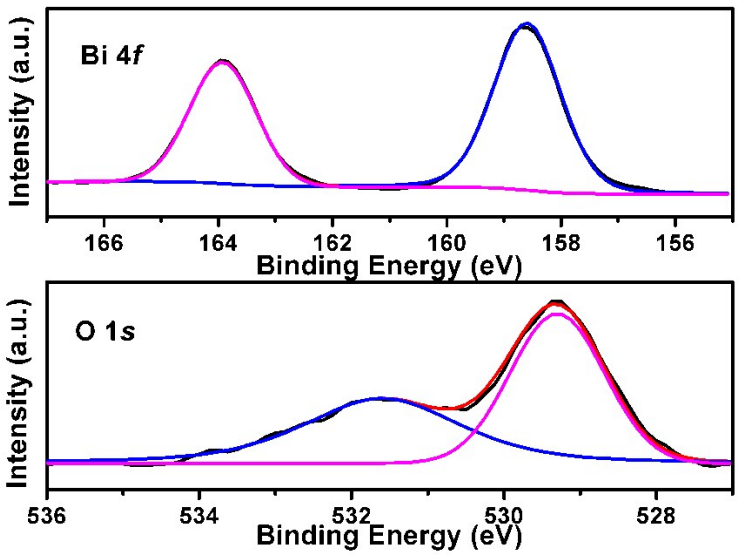


Figure S4. X-ray photoelectron spectrum of Bi 4f and O 1s. Two symmetric peaks of the sample appears at ca. 158.8 eV for Bi $4f_{5/2}$ and ca. 164.0 eV for Bi $4f_{7/2}$. For O 1s, two peaks at 529.3 eV and 531.7 eV are observed, which are assigned to lattice oxygen and bridging hydroxyls, respectively. The XPS peaks of Ta element were not shown here because XPS peaks of Ta $4f_{5/2}$ (locates at 23.5 eV) and Bi $5d_{5/2}$ (locates at 23.5 eV) overlap together, and it is difficult to detect Ta when Bi exists.

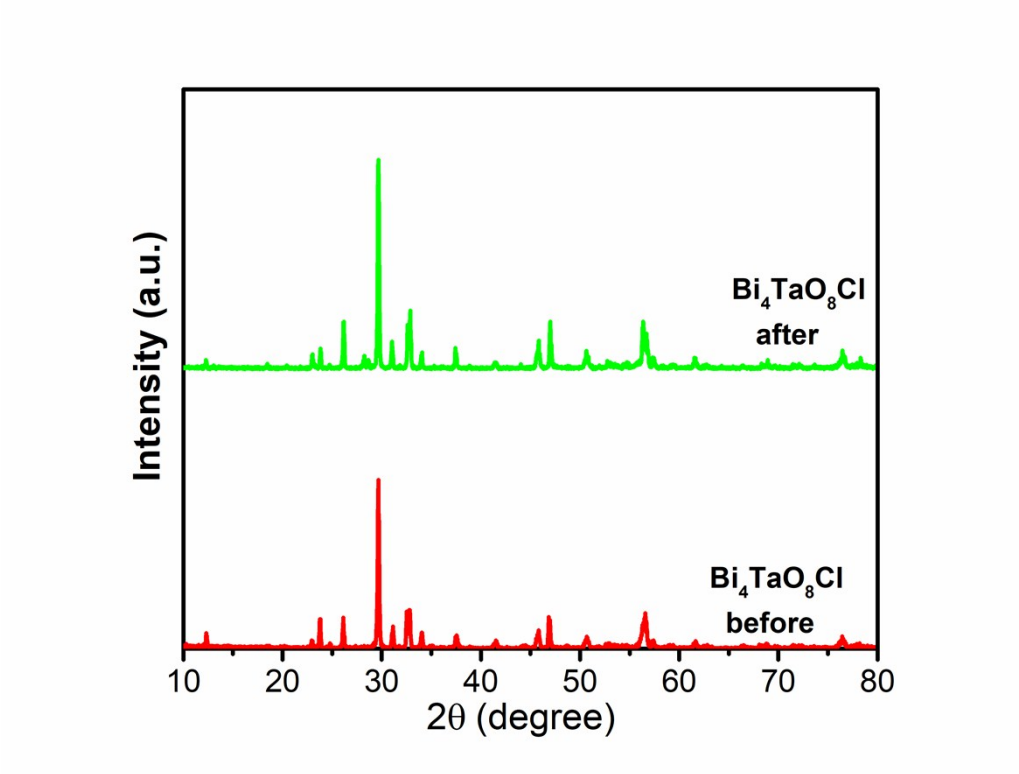


Figure S5. XRD pattern of Bi_4TaO_8Cl-750 before and after the photocatalytic experiment.

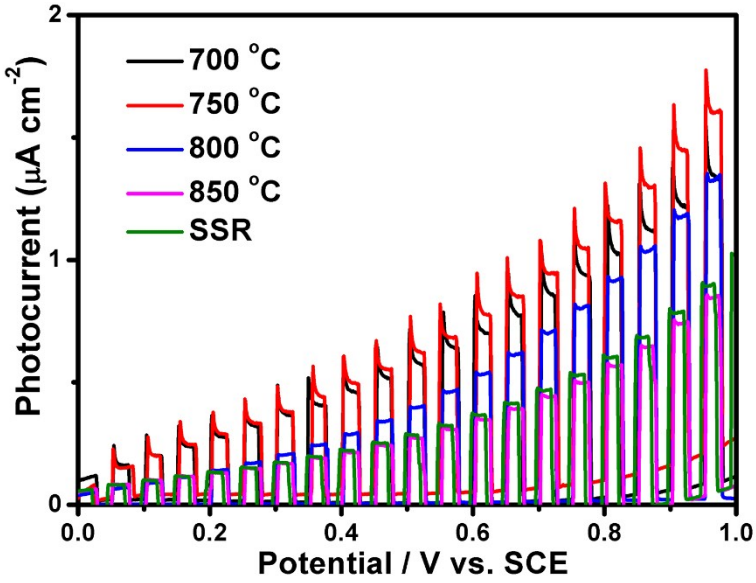


Figure S6. Transient photocurrent of as-prepared samples under visible light illumination ($\lambda >$ 420 nm).

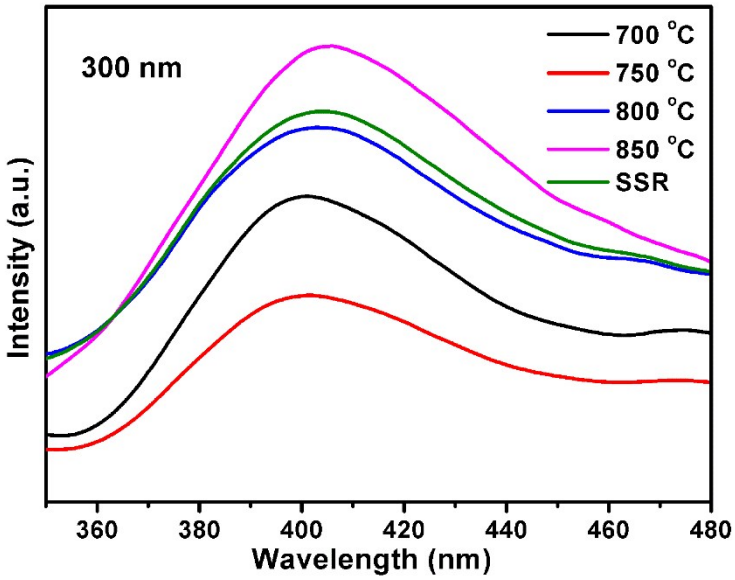


Figure S7. PL spectra the Bi_4TaO_8Cl sample with an excitation at 300 nm.