Electronic Supplementary Information

BiOBr-Photocatalyzed *cis-trans* Isomerization of 9-Octadecenoic Acids in Different Atmospheres

Xiaochao Zhang[a,*], Jiabing Wei[a], Guangmin Ren[a], Changming Zhang[a], Zhanfeng Zheng[b] and Caimei Fan[a]

[a]College of Chemistry and Chemical Engineering, Taiyuan University of Technology, Taiyuan 030024, PR China. E-mail: zhangxiaochao@tyut.edu.cn; Tel.: +86-15503477962; Fax: +86-351-6018554.

[b]State Key Laboratory of Coal Conversion, Institute of Coal Chemistry, Chinese Academy of Sciences.

NMR sample measurement and preparation.

^{1}H NMR spectra were acquired on a Bruker AV-III 400 MHz NMR spectrometer (9.39 T) equipped with autosampler at room temperature (25℃). ^{1}H NMR data were obtained at frequencies of 400.13 MHz. The NMR parameters for ^{1}H measurements are as follows: pulse program for acquisition, zg30; P1, 9.7 μs; PLW1, 18 W; AQ, 4.09 s; D1, 1.0 s; DS, 2; and NS, 16.[1] ^{1}H NMR chemical shifts are reported in parts per million (ppm) with TMS and referenced via residual proton resonances of the corresponding deuterated solvent ($CDCl_3$: 7.26 ppm). The spectra were acquired using DMSO-d6 for field-frequency lock. Approximately, 20 mg of the tested sample was dissolved in 0.6 mL of $CDCl_3$, and the solution was sonicated to ensure complete dissolution prior to NMR analysis. After complete dissolution, the solution was transferred quickly to a 5mm NMR tube.

Table S1 IR peaks assignments of pure oleic acid.

Frequency/cm^{-1}	Assignments	Frequency/cm^{-1}	Assignments
3006	Cis ν(-CH=)	1377	δ_s(-CH_3)
2921	ν_{as} (-CH_2)	1412	δ_s(α-CH_2)
2854	ν_s (-CH_2)	1284	ν(C-O)
2673	ν(-OH) of dimeric COOH	938	γ(-OH)
1715	ν(C=O) of dimeric COOH	723	ρ(-CH_2)
1464	δ_s(-CH_2)		

Table S2 ^{1}H NMR peaks assignments of pure oleic acid and elaidic acid

Proton(s)	Chemical shift (ppm)		Proton(s)	Chemical shift (ppm)	
	oleic acid	elaidic acid		oleic acid	elaidic acid
-C**H**$_3$	0.880	0.877	-C**H**$_2$-CH=CH-C**H**$_2$-	2.018	1.967
-(C**H**$_2$)$_n$-	1.267-1.311	1.260-1.298	-C**H**$_2$COOH	2.347	2.344
-C**H**$_2$-CH$_2$COOH	1.633	1.627	-C**H**=C**H**-	5.346	5.379

The effect of BiOBr dosage and irradiation time.

The effect of BiOBr dosage (0.05, 0.1, 0.2, 0.5 g) and irradiation time (2, 6, 12, 16 h) about the photocatalyzed isomerization of oleic acid in N_2 atmosphere were evaluated, as displayed in Fig. S1 and Fig. S2.

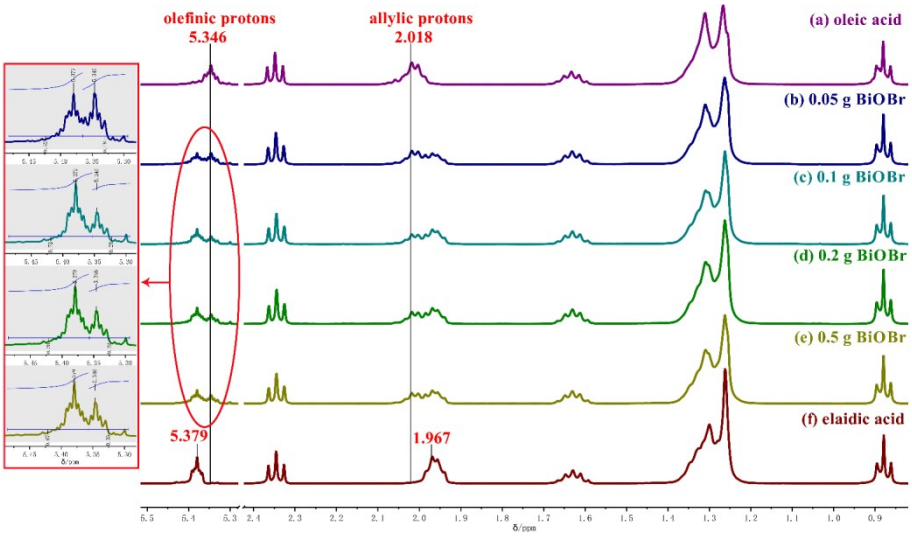

Fig. S1 Effect of BiOBr dosage on photocatalytic isomerization of oleic acid in N_2 atmosphere (1 mL oleic acid, 14 mL H_2O, irradiation time of 12 h and constant temperature of 25°C).

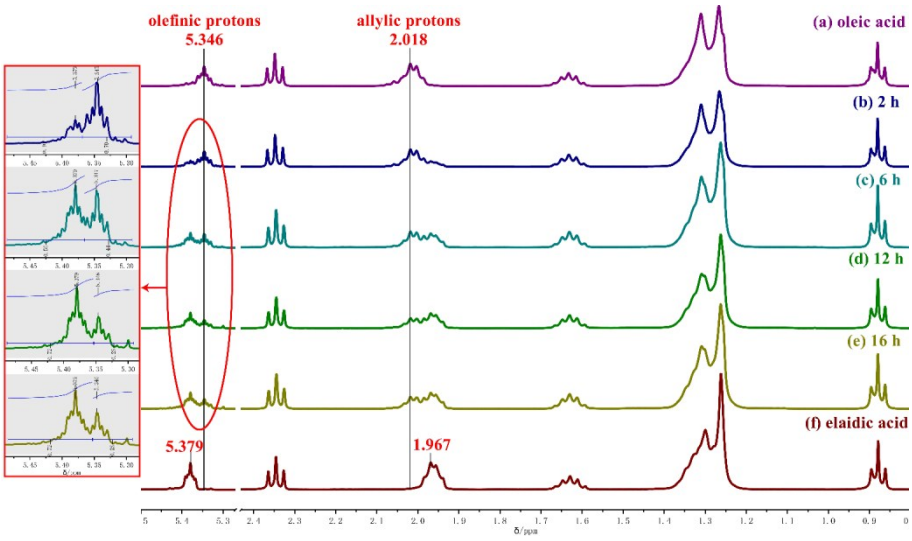

Fig. S2 Effect of irradiation time on BiOBr photocatalyzed isomerization of oleic acid in N_2 atmosphere (1 mL oleic acid, 14 mL H_2O, 0.1 g BiOBr and constant temperature of 25°C).

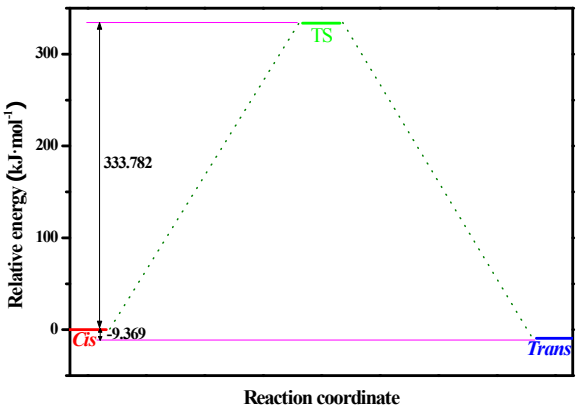

Fig. S3 The potential energy profiles for *cis-trans* isomerization of oleic acid.

The active trapping experiments.

The scavengers (1 mM) of ammonium oxalate ($(NH_4)_2C_2O_4$) and silver nitrate ($AgNO_3$) were employed for the trapping of reactive species holes (h^+) and electrons (e^-), respectively.[2,3] The effect of active species scavengers on the photocatalytic isomerization of oleic acid over BiOBr in N_2 atmosphere is shown in Fig. S4.

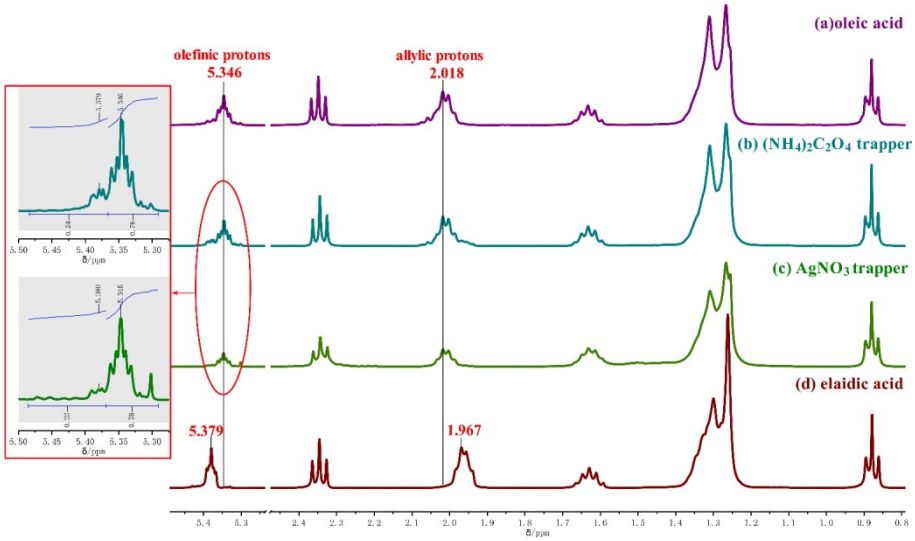

Fig. S4 Photocatalytic isomerization yield of oleic acid over BiOBr in N_2 atmosphere with different trappers: (a) oleic acid, (b) $(NH_4)_2C_2O_4$, (c) $AgNO_3$, (e) elaidic acid, (1 mL oleic acid, 14 mL H_2O, 0.1 g BiOBr and constant temperature of 25°C).

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