Supporting Information

Environmental Processing of Short-Chain Fatty Alcohols Induced by Photosensitized Chemistry of Brown Carbons

Bo You,[†] Siyang Li,[†] Narcisse T. Tsona,[‡] Jianlong Li,[†] Li Xu,[†] Zhaomin Yang, [†] Shumin Cheng, [†] Qingcai Chen,[§] Christian George,[∥,⊥] Maofa Ge,[+] and Lin Du[*,†]

[†]Environment Research Institute, Shandong University, Qingdao 266237, China

[‡]School of Life Science, Shandong University, Qingdao 266237, China

[§]School of Environmental Science and Engineering, Shaanxi University of Science and Technology, Xi'an 710021, China

[∥]School of Environmental Science and Engineering, Shandong University, Qingdao 266237, China

[⊥]Université Claude Bernard Lyon 1, CNRS, IRCELYON, F-69626 Villeurbanne, France

[+]State Key Laboratory for Structural Chemistry of Unstable and Stable Species, CAS Research/Education Center for Excellence in Molecular Sciences, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China

* Correspondence to: Lin Du (lindu@sdu.edu.cn)

Summary: 7 pages, 3 tables, 3 figures, 1 scheme.

Table S1. Peak assignments of FTIR spectra (ν, stretching vibration; σ, bending vibration).

Absorption Bands (cm^{-1})			Assignment	Function Group
MG-AS	**MG-Gly**	**IC**		
-	2958	2958	ν_{as} (C-H)	$-CH_3$
2923	2923	2926	νs (C-H)	$-CH_2-$
2858	2854	2857	νas (C-H)	
1456	1463	1459	σ (C-H)	$-CH_3$
1049	1047	1054	ν (C-O)	$-C-OH$
1382	1378	1375	σ (C-H)	$-\overset{\vert}{\underset{\vert}{C}}H-$
1112	1120	1124	σ (C-C-C)	$-C-\overset{C}{\underset{\vert}{C}}-$
1707/1713	1709/1710	1707/1708	ν (C=O)	$-\overset{O}{\overset{\Vert}{C}}-OH$
-	3095	-	ν (O-H)	
1675	1662	1652	ν (unsaturated C=O)	$-C=C-\overset{O}{\overset{\Vert}{C}}-H$
1635	1635	-	ν (C=C)	

Table S2. Detected compounds by GC-MS during 1-octanol coated BrC samples under irradiation.

Classification	Formula	Assignment	Source		
			MG + AS	MG + Gly	IC
Alkenes	C_5H_{10}	pentene	✓	✓	✓
	C_6H_{12}	4-methyl-1-pentene	✓[a]	✓[a]	✓[a]
	C_7H_{14}	1-heptene	✓	✓	✓
	C_8H_{16}	1-octene	✓	✓	✓
		2-octene	✓	✓	✓
Saturated aldehydes	$C_6H_{12}O$	hexanal	✓	✓	✓
	$C_7H_{14}O$	heptanal	✓	✓	✓
	$C_8H_{16}O$	octanal	✓	✓	✓
Unsaturated aldehydes	$C_8H_{14}O$	octenal	✓	✓	✓
Saturated ketones	C_4H_8O	2-butanone	✓	✓	✓
	$C_8H_{16}O_2$	8-hydroxy-2-octanone	✓	✓	✓
Saturated acids	$C_2H_4O_2$	acetic acid	✓	✓	-
	$C_7H_{14}O_2$	heptanoic acid	✓	✓	✓
	$C_8H_{16}O_2$	octanoic acid	✓	✓	✓
	$C_8H_{14}O_3$	7-oxo-octanoic acid	✓[a]	✓[a]	✓[a]
Unsaturated acids	$C_8H_{14}O_2$	octenoic acid	✓	✓	✓
Saturated alcohol	$C_8H_{18}O_2$	1,3-octanediol	✓[a]	✓[a]	✓[a]
		1,2-octanediol	✓[a]	✓[a]	✓[a]
		1,7-octanediol	✓[a]	✓[a]	✓[a]
Esters	$C_9H_{18}O_2$	formic acid, octyl ester	✓	✓	-
	$C_9H_{14}O_3$	4-pentenoic acid, 2-acetyl-, ethyl ester	✓[a]	✓[a]	✓[a]
	$C_{10}H_{20}O_2$	acetic acid, octyl ester	✓	✓	-
	$C_{11}H_{20}O_2$	2-propenoic acid, octyl ester	✓	✓	✓
	$C_{16}H_{32}O_2$	octanoic acid, octyl ester	✓	✓	✓
Dimers	$C_{15}H_{30}O_2$	-	✓	✓	✓
	$C_{16}H_{32}O_4$	-	✓	✓	✓
	$C_6H_{11}N_3O_3$	-	✓	✓	-
	$C_{21}H_{38}O_6$	-	✓	✓	-
	$C_{25}H_{48}O_6$	-	✓	✓	-

[a] Tentative assignment.

Table S3. Concentrations of fatty alcohols in marine and urban aerosols (ng m^{-3}).

Location	Type	Period	Fatty alcohols
Beijing, China[1]	$PM_{2.5}$	2013.9-2014.7	109 – 190
Changdao, China[2]	$PM_{2.5}$	2003.3-2004.1	19.7 – 29.1
East China Sea[3]	TSP	2014.5-2014.6	18.4 - 222
Jeju Island, Korea[4]	TSP	2001.4	5.0 – 134
Sapporo, Japan[4]	TSP	2001.4	0.80 – 38.0
Arctic Ocean[5]	TSP	2009.8	0.42 – 8.13

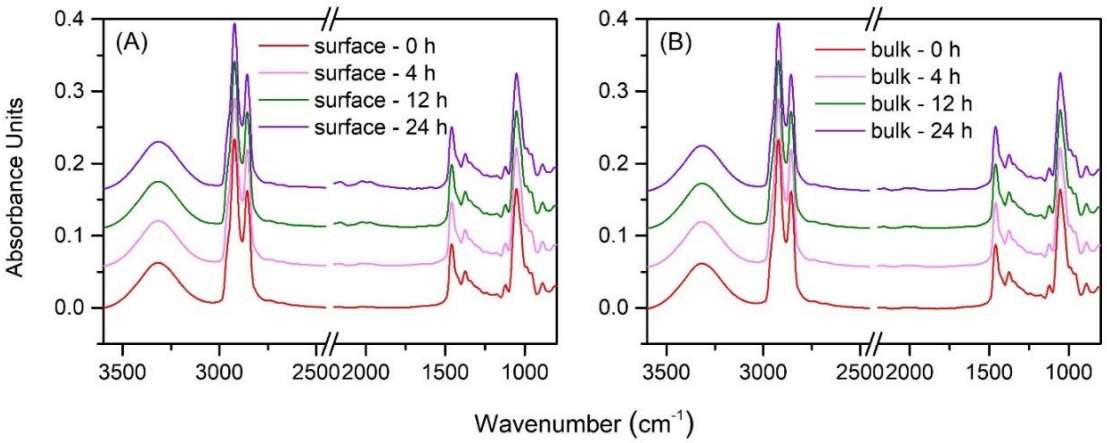


Figure S1. Time-resolved infrared spectra: phototransformation of 1-octanol under irradiation without photosensitizers. ATR-FTIR absorbance spectra of (A) the surface reaction and (B) the bulk reaction, and they were obtained by measuring the samples that have reacted in-situ on the ATR crystal and in the quartz reactor, respectively.

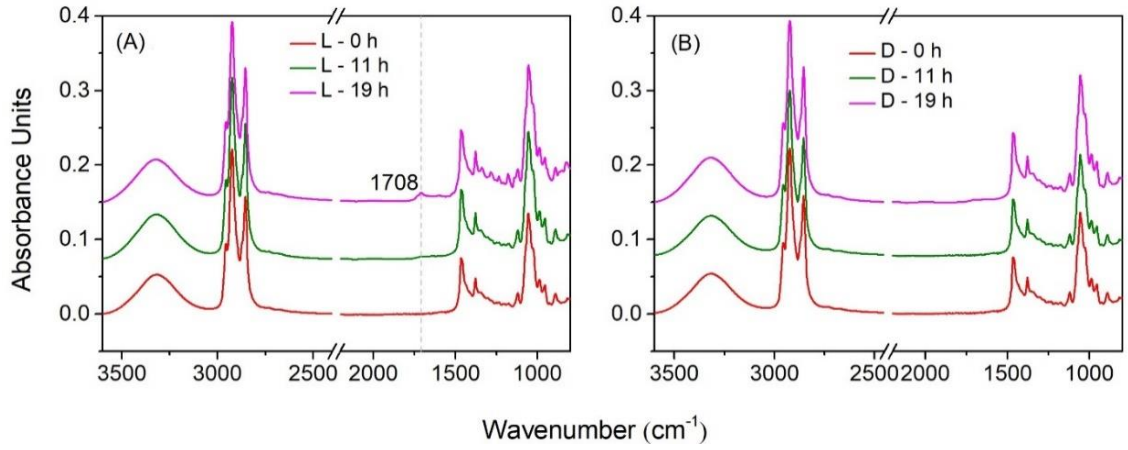


Figure S2. Time-resolved infrared spectra: phototransformation of 1-octanol in the presence of IC photosensitizer (A) under irradiation and (B) in the dark condition. ATR-FTIR absorbance spectra of the bulk reaction were obtained by measuring the samples that have reacted in the quartz reactor.

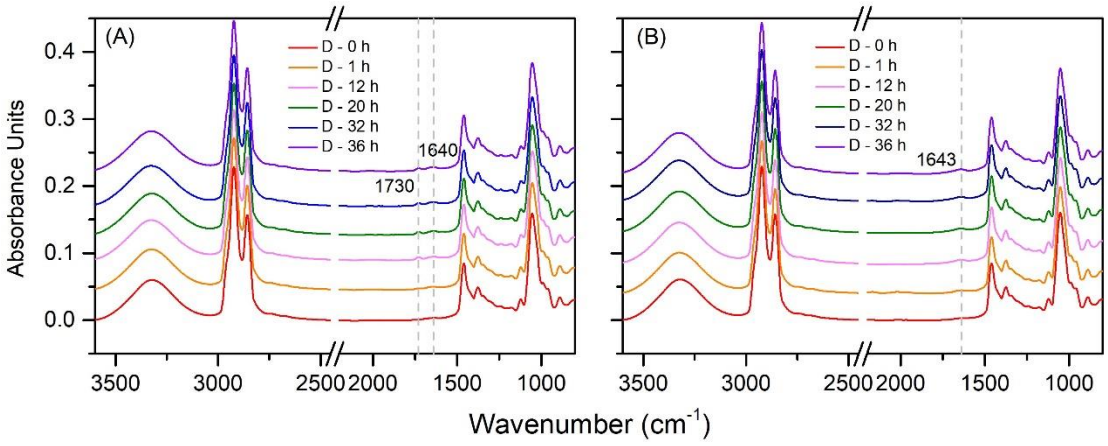
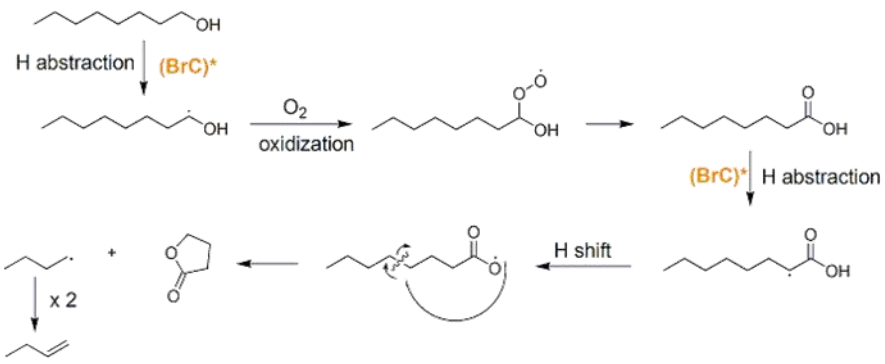


Figure S3. Time-resolved infrared spectra: phototransformation of 1-octanol in the presence of (A) MG-AS BrC and (B) MG-Gly BrC in the dark condition. ATR-FTIR absorbance spectra of the bulk reaction were obtained by measuring the samples that have reacted in the quartz reactor (D: dark).



Scheme S1. Proposed mechanism for producing butene through C_4 lactone formation.

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