Supplement to Atmospheric Organic-phase Photo-sensitized Epoxidation of Alkenes by α-dicarbonyls

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Table S1. Control experiments conducted at 0 °C with 0.055 M α-pinene, 0.18 M biacetyl and 30 min of UV irradiation with Spectroline UV lamp, if applicable.

Experiment description	Biacetyl	Air/Oxygen	UV irradiation	Epoxide yield
1. Base experiment	Yes	Air	Yes	11%
2. α-Pinene control	No	None	No	0.2%
3. No air	Yes	None	Yes	$\sim$2%
4. No biacetyl	No	Air	Yes	0.2%
5. No irradiation	Yes	Air	No	0.2%
6. Oxygen	Yes	Oxygen	Yes	9.7%

Table S2. Epoxide formation at different initial concentrations of α-pinene and biacetyl.

Experiment number	α-pinene concentration, M	Biacetyl concentration, M	Epoxide concentration, M	Yield
1	0.100	0.100	0.0041	4.1%
2	0.055	0.100	0.0042	7.6%
3	0.100	0.180	0.0072	7.2%
4	0.004	0.100	0.004	100%

References

Gueymard, C. A., Myers, D., and Emery, K.: Proposed reference irradiance spectra for solar energy systems testing, Sol Energy, 73, 443-467, doi:10.1016/S0038-092x(03)00005-7, 2002.

Horowitz, A., Meller, R., and Moortgat, G. K.: The UV-VIS absorption cross sections of the alpha-dicarbonyl compounds: Pyruvic acid, biacetyl and glyoxal, J Photoch Photobio A, 146, 19-27, 2001.

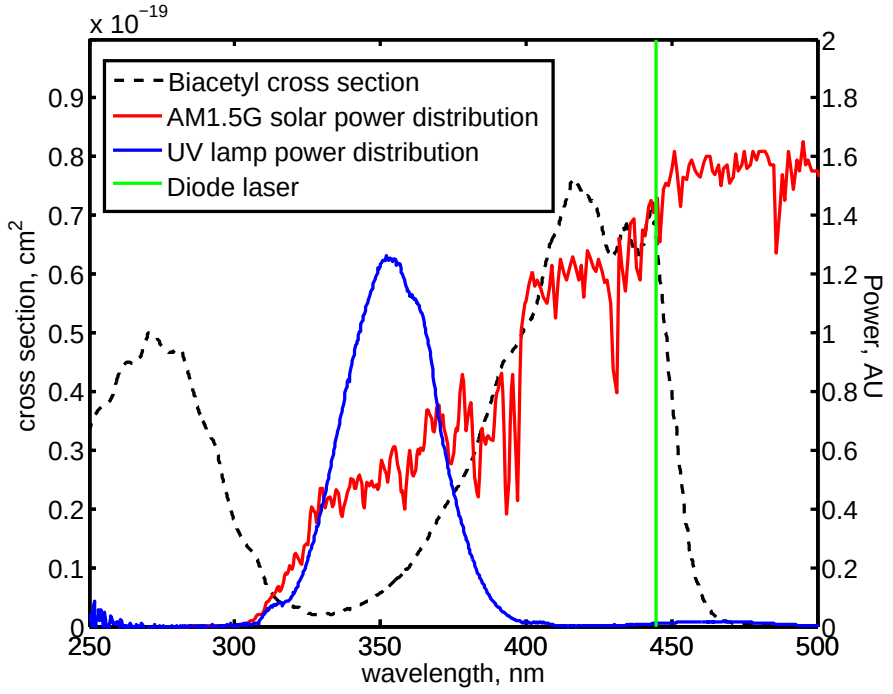

Fig. S1. Biacetyl cross section adapted from Horowitz et al. (2001) and the spectral distribution of all the light sources applied in this study. The relative power between the light sources does not represent the real power comparison between them. The AM 1.5G solar spectral distribution is adapted from the American Society for Testing and Materials (ASTM) 173-03 standard (Gueymard et al., 2002), available at http://rredc.nrel.gov/solar/spectra/am1.5/. The UV lamp power distribution is measured in this study.

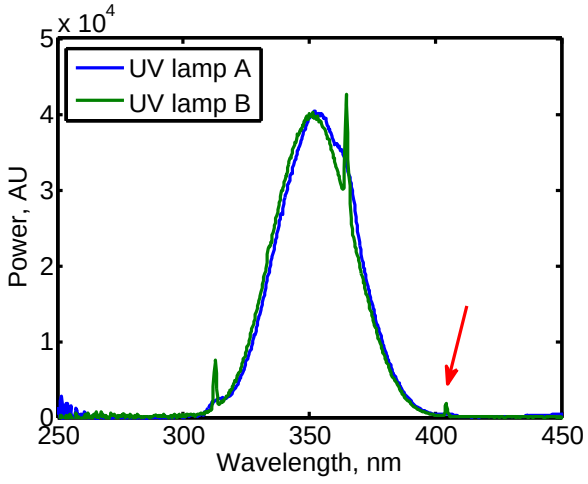

Fig. S2. Comparison of the power distribution spectra of the two UV lamps used in the variable temperature studies (Fig. 4). The peak denoted by the red arrow is responsible for the high observed rate constants in Fig. 4B.

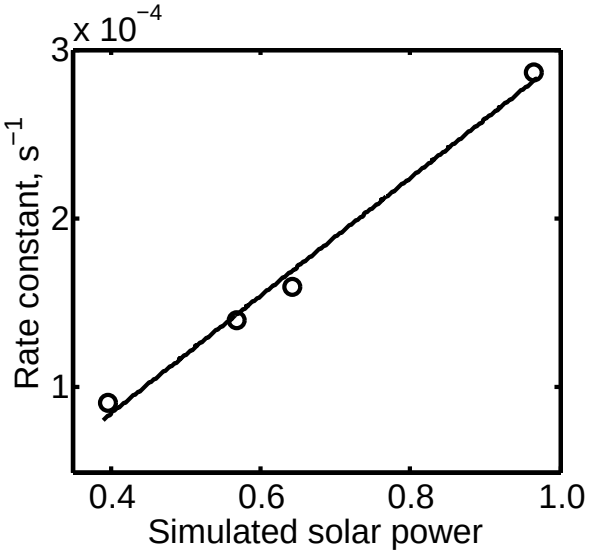

Fig. S3. The epoxidation rate constant of α-pinene via solar simulator. The x-axis is the light power scaled to solar power.