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Liquid–liquid phase separation in secondary organic aerosol particles produced from α-pinene ozonolysis and α-pinene photooxidation with/without ammonia

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Supplementary Material of

Table S1. The O:C ratio and experimental conditions of SOA particles produced from β-caryophyllene ozonolysis, limonene ozonolysis, toluene photo-oxidation, and isoprene photo-oxidation for study on liquid-liquid phase separation studied from Song et al. (2017).

SOA	VOC conc. (ppb)	O_3 conc. (ppb)	SOA generation	Residence time (hr)	O:C
β-caryophyllene O_3	30 – 700	1.2×10^4 – 3.0×10^4	Flow tube reactor	0.01	0.36[a] – 0.38[a]
Limonene O_3	70 – 2000	1.3×10^4 – 3.0×10^4	Flow tube reactor	0.01	0.34[b] – 0.40[b]
Toluene OH	200 – 1000	3.0×10^4	Oxidation flow reactor	0.03	1.14[c] – 1.30[c]
Isoprene OH	700 – 7000	1.0×10^4 – 3.0×10^4	Oxidation flow reactor	0.03	0.52[d] – 0.89[a]

[a] Li et al. (2015); [b] Heaton et al. (2007); [a] Song et al. (2017); [d] Lambe et al. (2015)

Table S2. The O:C ratio and experimental conditions of SOA particles produced from α-pinene ozonolysis and photo-oxidation investigated in this study and previous studies. '*NA*' indicates no data available.

SOA	VOC conc. (ppb)	O_3 conc. (ppb)	SOA generation	Residence time (hr)	O:C	Reference

α-pinene O_3	1000	1.0×10^4	Flow tube reactor	0.06	*NA*	This study
	100	1.5×10^4	Oxidation flow reactor	0.01 – 1.70	0.42 – 0.44	Li et al. (2015)
	0.9 – 91.1	3.0×10^2	Harvard environmental chamber	3.4	0.3 – 0.45	Shilling et al. (2009)
	500 – 1000	1.3×10^1 – 3.0×10^1	Flow tube reactor	0.01 – 0.09	0.42 – 0.45	Zhang et al. (2015a)
	~600	$\sim 7.0 \times 10^2$	Environmental chamber	*NA*	0.23 – 0.29	Järvinen et al. (2016)
	150	$\sim 2.0 \times 10^2$	Environmental chamber	*NA*	0.45 – 0.55	Zhang et al. (2015b)
	50	1.8×10^2	Caltech chamber	*NA*	0.3 – 0.56	Chhabra et al. (2010)
α-pinene OH	1000	2.0×10^3 – 6.0×10^3	Flow tube reactor	0.06	*NA*	This study
	41 – 100	1.5×10^4 – 3.0×10^4	Potential aerosol mass reactor (PAM)	0.03	0.40 – 0.90	Lambe et al. (2015)
	4 - 150	8.0×10^3 – 2.0×10^4	PAM	*NA*	0.6 – 0.9	Chen et al. (2013)
	7 – 50	1.2×10^2 – 1.3×10^2	PSI chamber	0.3 – 0.5	0.45 - 0.65	Pfaffenberger et al. (2013)

	50	1.8×10^2	Caltech Chamber	*NA*	0.35	Chhabra et al. (2011)

1

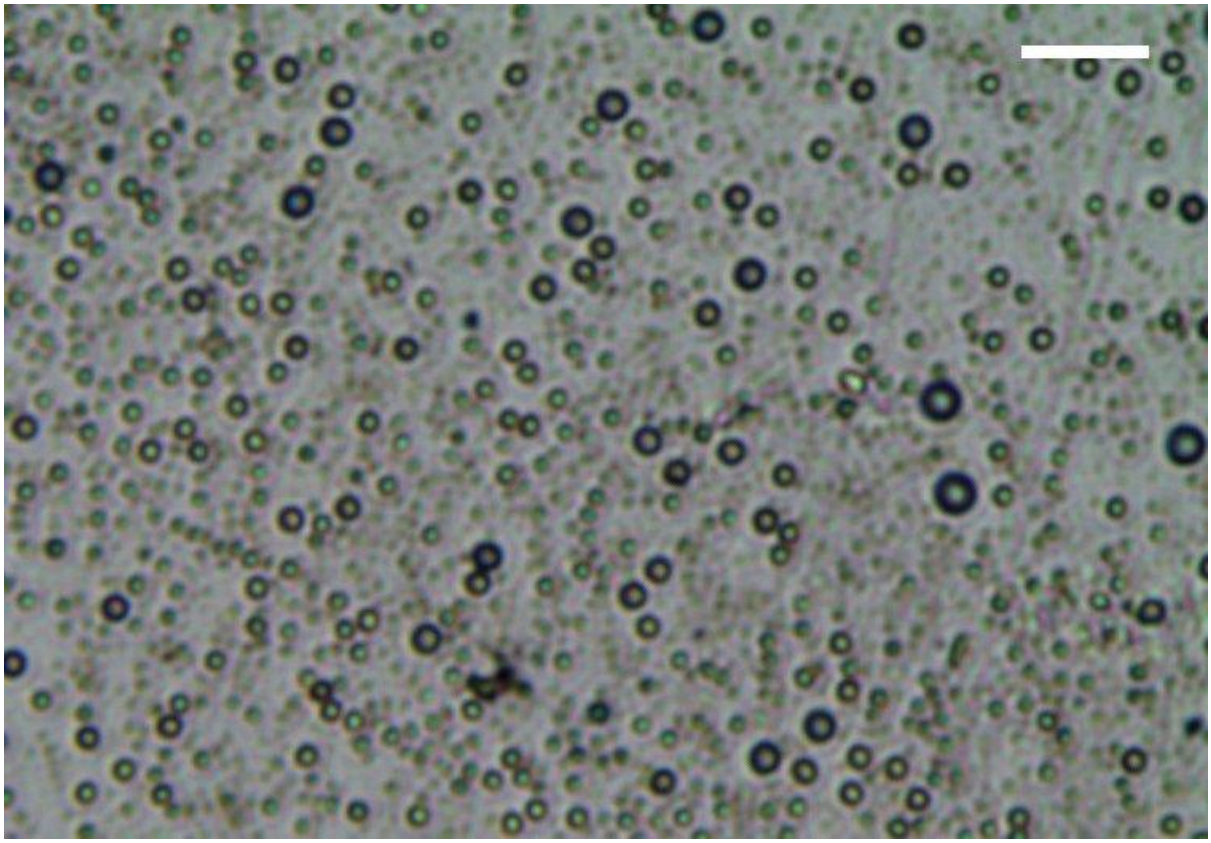

Fig. S1. An image of collected SOA particles derived from α-pinene ozonolysis (α-pinene O_3 #1 in Table 1) on a hydrophobic substrate at the outlet of the flow tube reactor. The size of the scale bar is 20 μm.

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