Using the CLF to study a levitated cooking aerosol proxy

Adam Milsom, University of Birmingham

People!

Natural Environment Research Council

Science and Technology Facilities Council

Central Laser Facility

diamond

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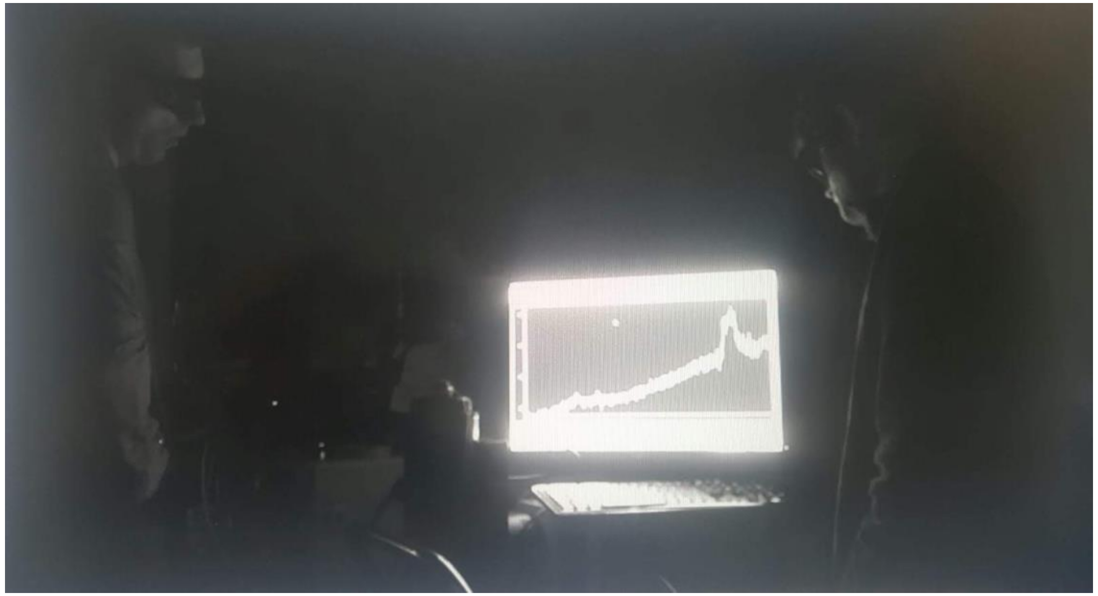

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Dr Eleonore Mason
Dr Esko Kokkonen
Dr Niklas Johansson
Dr Ben Woden
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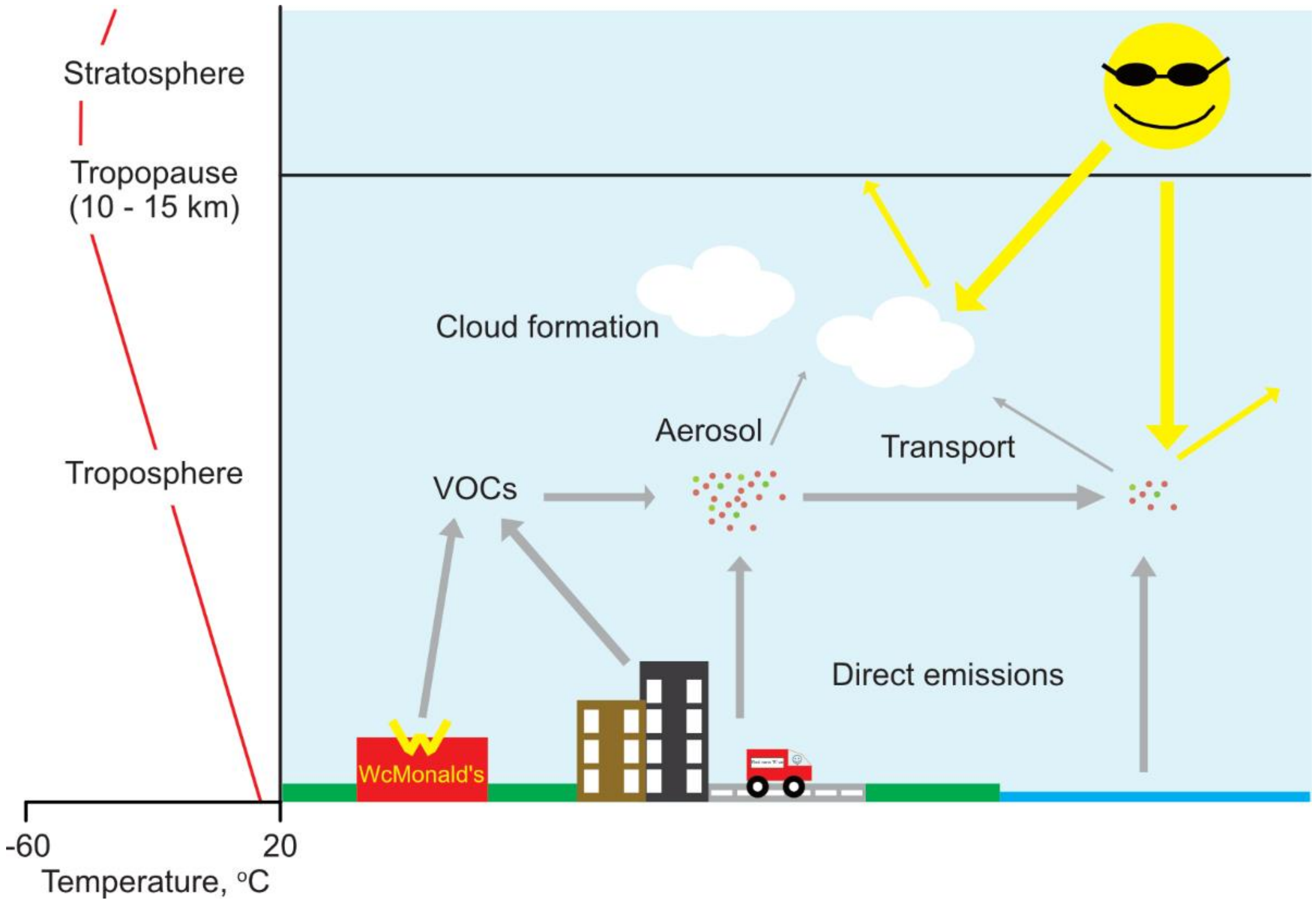
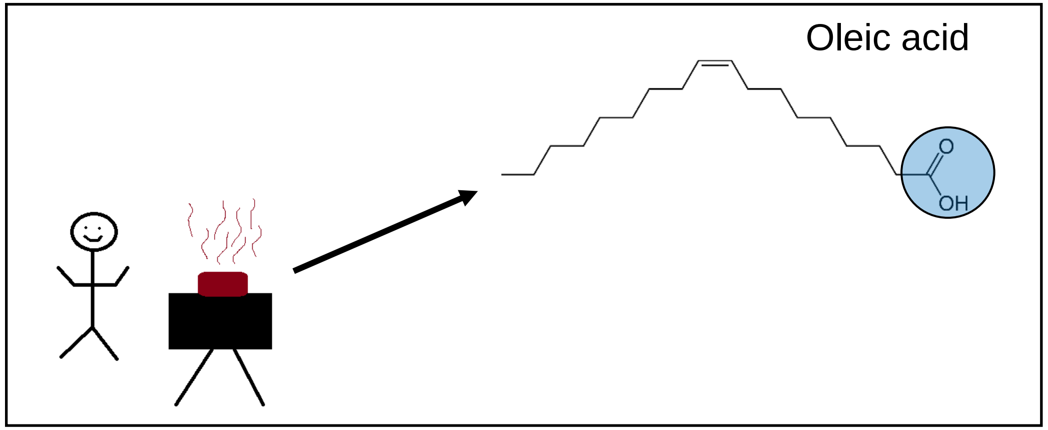
Aerosols in the atmosphere

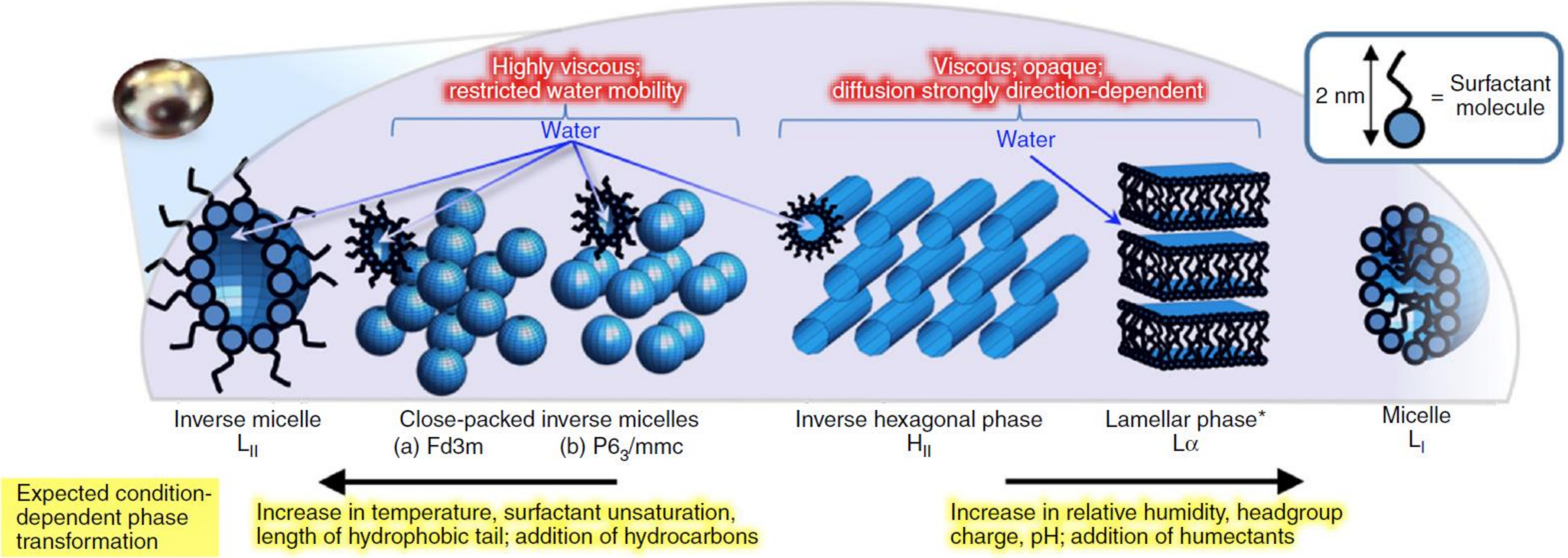


- Air quality
- Health
- Climate

Oleic acid – a surfactant cooking emission



Oleic acid lasts longer in the atmosphere than predicted in the lab, why?



Pfrang et al., *Nat. Commun.*, 2017

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Levitated particles (simultaneous small-angle X-ray scattering (SAXS) and Raman)

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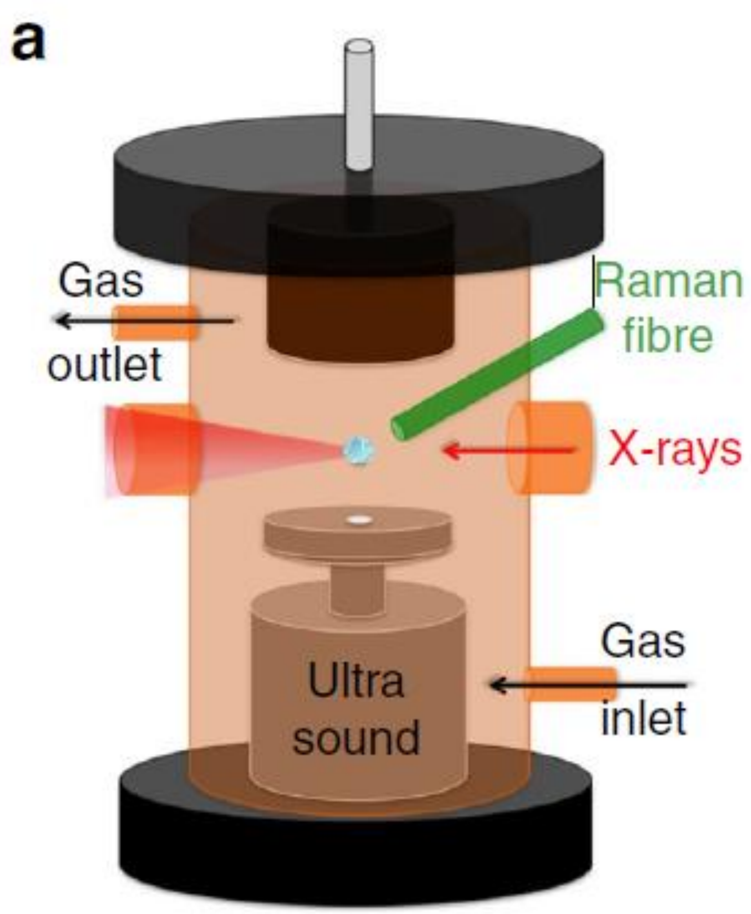
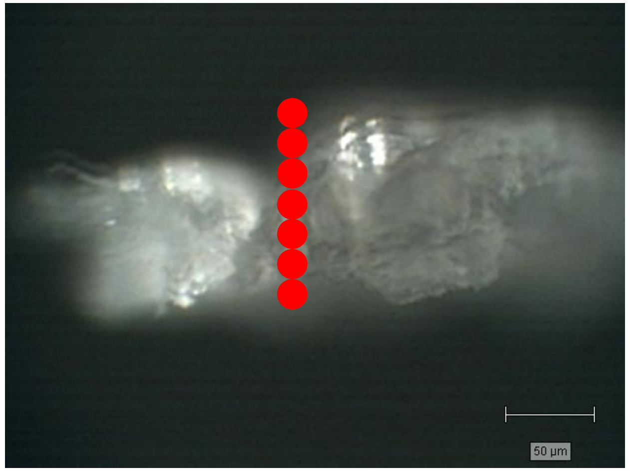
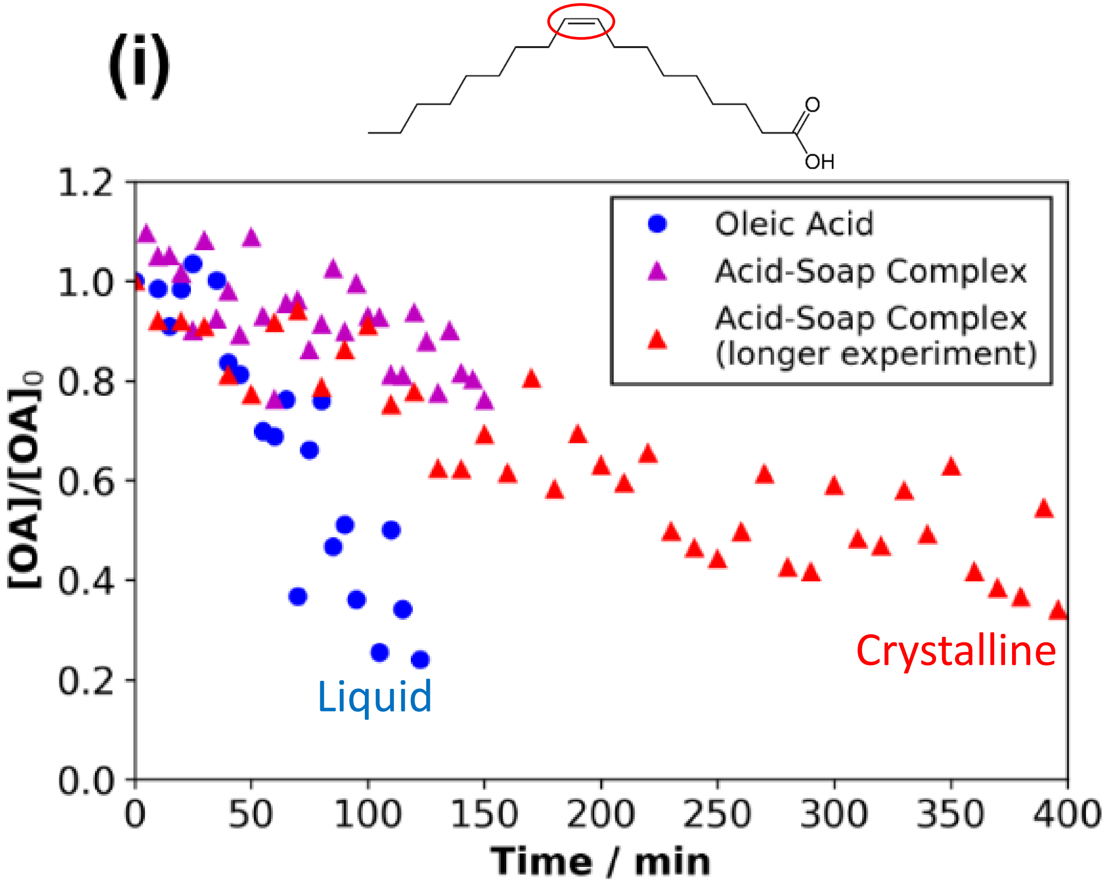
The experiment



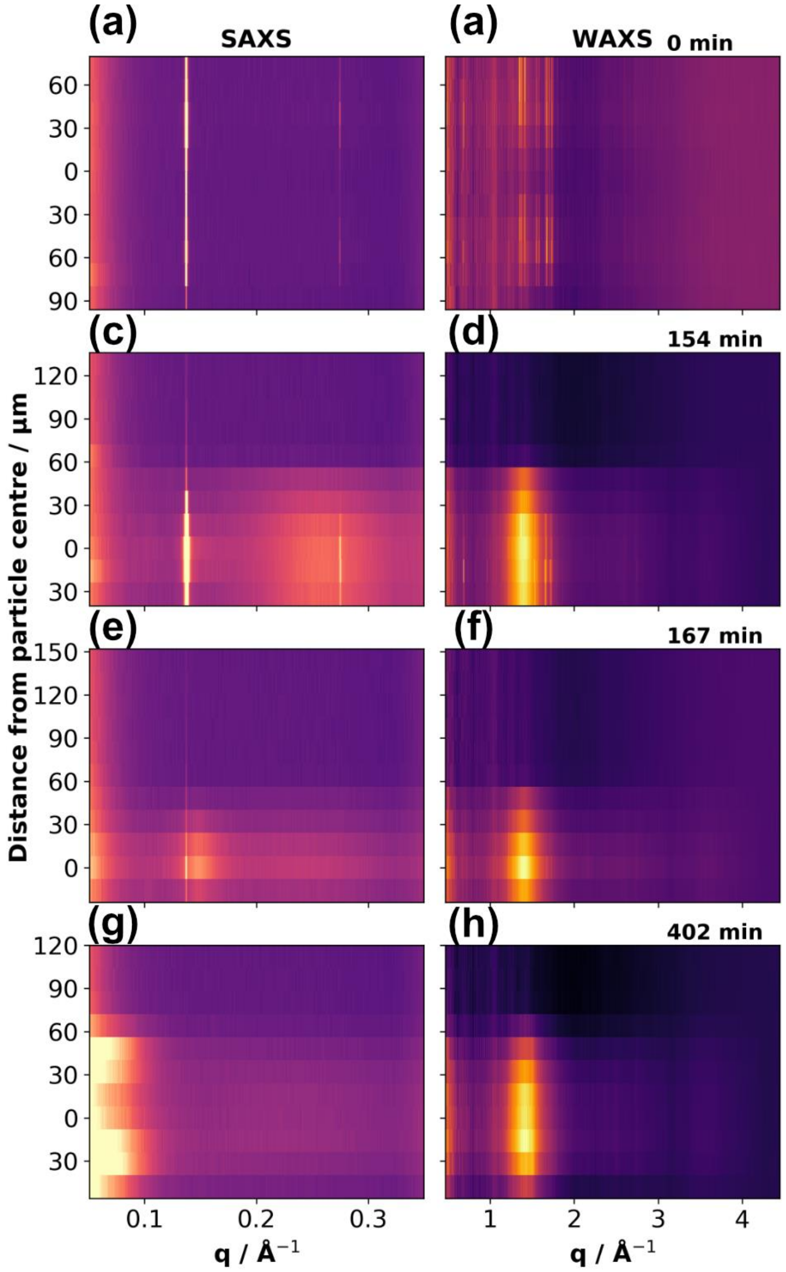


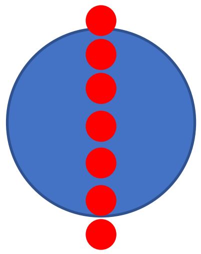
From Pfrang et al., *Nat. Commun.*, 2017, doi: 10.1038/s41467-017-01918-1

Why CLF? - Slowed reaction kinetics



Milsom et al., *Atmos. Chem. Phys.*, 2021





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Implications and summary

- Crystalline phase significantly increases reactive lifetime of oleic acid.

- Possible inert “crust” forming (first experimental evidence), oleic acid still left after loss of crystallinity (Raman evidence). Longer lifetime for particle contents?

- Complementary SAXS-Raman enabled us to make these conclusions.

- More work to come…

References

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Adam Milsom, Adam M. Squires, Jacob A. Boswell, Nicholas J. Terrill, Andrew D. Ward, and Christian Pfrang, *Atmos. Chem. Phys.*, **21**, 15003–15021, https://doi.org/10.5194/acp-21-15003-2021, 2021.

The persistence of a proxy for cooking emissions in megacities: a kinetic study of the ozonolysis of self-assembled films by simultaneous small and wide angle X-ray scattering (SAXS/WAXS) and Raman microscopy.

Adam Milsom, Adam M. Squires, Ben Woden, Nicholas J. Terrill, Andrew D. Ward, and Christian Pfrang, *Faraday Discuss*., **226**, 364-381, https://doi.org/10.1039/D0FD00088D, 2021.

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