

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2021-270

Anonymous Referee #1

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Referee comment on "An organic crystalline state in ageing atmospheric aerosol proxies: spatially resolved structural changes in levitated fatty acid particles" by Adam Milsom et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-270-RC1>, 2021

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Review of "an organic crystalline state in aging atmospheric aerosol proxies: spatially resolved ..." by Milson et al.

This paper investigates the phase behavior of particles containing mixtures of oleic acid and sodium oleate as a function of relative humidity and ozone exposure. The particles are characterized in detail using SAXS, WAXS, and Raman spectroscopy. The results show that at low RH values a crystalline state prevails, while at higher RH values particles containing inverse micelles prevail. In addition, the results show that the presence of a crystalline state impedes the uptake of water and ozone.

The results are interesting, the paper is well written, and the experiments appear to be carefully done. I support this paper for publication in ACP after the following comments are addressed.

Major comment:

As a proxy for cooking aerosol and sea spray aerosol the authors used a 1:1 wt ratio of oleic acid and sodium oleate. I am wondering how well this proxy represents cooking aerosol, or sea spray aerosol, or mixtures thereof? I assume that particles containing a 1:1 ratio of oleic acid and sodium oleate (without other organics or salts) are not present in the atmosphere. Hence, I am wondering how to extrapolate the results in the current study to the atmosphere. Related, how sensitive are the result to the 1:1 ratio of oleic acid and sodium oleate? If different ratios are used or if other organic species or salts are added, do the authors expect the results to be completely different? These points should be discussed in the revised manuscript.

Minor comment:

The authors include changes due to relative humidity changes in the category of "aging". I would not refer to this as an aging process.