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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Secondary organic material formed by methylglyoxal in aqueous aerosol mimics – Part 1: Surface tension depression and light-absorbing products" *by* A. N. Schwier et al.

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This is an interesting manuscript, clearly worthy of publication in ACP. However, I believe that the estimate of critical supersaturation lowering due to decreased surface tension has not been carried out in a way that would reflect current understanding, and the authors should redo the exercise for the final paper. In small droplets, surface active organics will be highly concentrated in the surface layer. At the same time, they are depleted from the bulk of the droplet, which causes the Raoult term to become smaller, counteracting the surface tension influence on critical supersaturation. The

depletion of the surfactant also causes the surface tension itself to increase. This "surface partitioning" effect, which follows from Gibbs' surface thermodynamics and finite size of the droplet, has been discussed in a number of recent papers (see list below). Lab experiments (Sorjamaa et al., Prisle et al.) have provided strong evidence that the effect is real, and usually leads to much smaller depression of critical supersaturation than what is estimated based on simple Köhler theory that doesn't account for surface partitioning.

I recommend that for the final paper, the authors provide an estimate of the critical supersaturation lowering that accounts for surface partitioning. A rough estimate for 100 nm particles might be possible using Fig. 2 of Sorjamaa and Laaksonen (2006).

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 15541, 2009.