

Interactive comment on “Hygroscopic growth and droplet activation of soot particles: uncoated, succinic or sulfuric acid coated” by S. Henning et al.

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Answers to Anonymous Referee 1

Major concerns and questions:

-How is it known that homogeneous nucleation of the coating substance wasn't occurring? Are the temperatures of the coating section and saturation tube low enough to avoid homogeneous nucleation of succinic and sulfuric acid?

The coating process in the flow tube was controlled by size distribution measurements with a SMPS instrument, which sampled directly behind the coating tube. In a first test run the saturator temperature was stepwise increased, at almost constant aerosol

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and saturator flows, until a nucleation mode indeed occurred. Then either the saturator temperature or the gas flow through the saturator, or both were decreased to suppress the nucleation mode. However, in the presented measurements monodisperse particles with sizes above 150 nm were investigated and thereby particles larger than those expected from homogenous nucleation.

– no changes in the text

-How much coating was deposited on the core soot particles? Can you quantify in monolayers? Are you assuming uniform coverage of the coating substance?

Under the assumption of spherical, uniformly coated particles a coating thickness on the particles could be calculated. However, as the investigated particles are of complex morphology we would rather not speculate on the coating thickness.

– no changes in the text

-It is unclear in the text what size soot particles were selected. I see 150 and 200nm for the HTDMA studies, but CCNC activation studies?

The CCNC was, other than stated in the manuscript, operated in diameter scanning mode (e.g. 30 sizes between 30 and 300nm, depending on the aerosol) at fixed supersaturation and at some measurements also in the saturation scanning mode at fixed diameters. This was done to get the best data set, depending on the particles size distribution (minimize effects of multiple charged particles, etc.) and observed activation properties (zooming in the activation regime). In Figure 5 we give now the exact particle diameters and we changed the manuscript text as follows:

– "In the work presented here we run both diameter and saturation scans."

-Do you have any hypotheses for why activation was observed for GFG-soot with Argon as the carrier gas?

"One hypothesis is based on the different gas properties, e.g. thermal conductivity and dielectric constant of the gases Argon (0.01772W/(mK), 1.000513) and Nitrogen (0.02583W/(mK), 1.00058). The different gas properties might result in a different spark temperature of the GFG. This could cause differences in the structure of the

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primary particles and thus influence the activation properties of the agglomerate. A second hypothesis is based on the purity of the carrier gases applied. We chose for both gases the same high purity of 6.0. Despite the high purity of 99.999999– We added the hypotheses - as presented above - in the manuscript.

Minor concerns or comments:

Thank you for reading the manuscript in detail. We corrected and / or clarified the passages, which were pointed out.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 28445, 2011.

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