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Interactive comment on "Impact of palmitic acid coating on the water uptake and loss of ammonium sulfate particles" *by* R. M. Garland et al.

Anonymous Referee #5

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General comments:

This manuscript is a good study of the impact of insoluble substances coatings on the deliquescence and efflorescence of ammonium sulfate particles. At present, most of the work in the literature mainly focused on soluble substances. A combination of techniques is used in parallel enabling a good characterization of the chemical and physical properties of the particles. Palmitic acid is found to have an impact on the deliquescence only for mixing ratios higher than 50 wt%. The efflorescence does however not seem to be affected by the coating of insoluble organic substances. The overall con-

clusion of the study is that the water uptake and loss of salt particles should not be affected if they are coated by insoluble substances.

Specific comments:

1. Introduction: more references should be added page 2049 line 2 especially the Tang et al. papers (such as Atmospheric Environment, Vol. 27A, no 4, 467-473, 1993).

2. Results section, page 2051 line 7: The non decomposition of palmitic acid is confirmed by its H-NMR spectra. The mass spectra obtained using the AMS are only shown for masses smaller than 100 amu (figure 4). Does the molecular peak 256 amu appear and confirm the presence of this molecule? Was the fragmentation pattern of pure palmitic acid also generated in the same conditions (AMS operating conditions) and compared to the one obtained in mixed particles? It would be interesting to have a little more details on how the AMS was operated (heater temperature, etc.). Related to this point, both figures 4 b and c are not necessary since the difference between the spectra is not that obvious.

3. Results section, page 2052 line 23: “spectra a-c” would be more appropriate than “figure a-c”. Same comment for lines 25 and 26 on page 2052; line 14 of page 2053; line 1 page 2054.

4. Results section, page 2053 lines 17 to 20: would it be possible that pure ammonium sulfate particles are also present but vaporize quickly under the beam?

5. Results section, page 2054 line 7: using the word “strong” is not appropriate here for this technique by its own (see your last sentence page 2055 lines 15-17).

6. Results section, page 2056 lines 8-10: how are the LWC values converted to growth factor? Does that explain the intermediate values obtained here for the deliquescence shown in figure 6? (Intermediate values versus a sharp sudden change observed when plotting growth factors).

7. Results section, page 2056 line 23: the sentence “Figure 7Ĕ.” is a little bit conflicting;

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in the previous sentence you state that palmitic acid is a non-deliquescent material.

8. Results section, page 2057 line 23: a reference should be added for the efflorescence RH of ammonium sulfate.

9. Conclusion section: the studies are performed for mixing ratios equal or smaller than 50 wt%. You however specify in the introduction that field data show the presence of more than 50 wt%. The impact of higher mixing ratios of insoluble organics can be non negligible on the latter cases. You may not conclude about the relevance of the study on an atmospheric basis.

Technical corrections:

1. Introduction section, page 2049 line 26: "Ĕ in several ways" instead of "in a several ways".

2. Results section, page 2056 line 16: "mixed aerosol particles" instead of "mixed aerosols".

3. Results section, page 2057 line 7: "ratioing" could be replaced by "taking the ratio of".

4. Conclusion section, page 2058 line 8: the end of the sentence is missing.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 2047, 2005.