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Interactive comment on "Processing of soot in an urban environment: case study from the Mexico City Metropolitan Area" *by* K. S. Johnson et al.

Anonymous Referee #1

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Referee report on "Processing of soot in an urban environmentĚ"

This paper reports on the mixing state of soot particles in Mexico City. The researchers performed a series of field measurements with several complimentary techniques to determine the mixing state of soot particles in an urban environment as well as the time required for soot particles to become internally mixed with other atmospheric particles. Understanding the mixing state of soot is crucial for predicting radiative properties of atmospheric particles and for predicting soot's atmospheric lifetime.

The results from this study have important implications and they improve the current understanding of the processing time of soot particles in an urban environment. For

example, the authors have shown that ambient soot particles which have been processed for less than a few hours are heavily internally mixed. Based on this, I suggest publication after the authors have addressed adequately the following points:

Page 5589, line 22: What is the source of the polydimethylsiloxane contamination?

Page 5594, line 16: "Overlapping S- and NH4+ confirm the presence of ammonium sulfate." Does the overlap confirm ammonium sulfate or does it just show sulfate ions and ammonium ions are on/in the same particles? Can this technique distinguish between ammonium sulfate and ammonium bisulfate?

Page 5595, line 8: "Whereas image (i) shows soot with a sulfate inclusion presumably from coagulation" Could this type of morphology result from a soot particle impacting on the collection grid first followed by impaction of a sulfate particle? In other words, could this be an artifact of the collection method? It would be beneficial to have a section that explains why the collection process does not change the mixing state. In other words, please justify that the "observed mixing state" in the measurements is the same as the mixing state in the atmosphere. Also how frequent are particles similar to the ones shown in image (i) observed compared to particles similar to the ones shown in image (ii), Figure 8.

Page 5596, line 20: "Two types of mixing shown by TEM analysis in Fig. 8 provide evidence for both coagulation and condensation of sulfate on soot." This statement should be weakened, unless the authors can justify that coagulation occurred in the atmosphere and not on the collection grids.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 5585, 2005.