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Interactive comment on "The surface properties of SOA generated from limonene and toluene using specific molecular probes: exploration of a new experimental technique" *by* B. Demirdjian and M. J. Rossi

Anonymous Referee #1

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This manuscript presents an exciting and innovative new idea: that it might be possible to perform a "chemical mapping" of the surfaces of aerosol particles, to determine which (reactive) functional groups are present there. Since heterogeneous reactions, physiological effects and water uptake by aerosol particles are all mediated by interactions at the surface, this probe could yield valuable insight into which surface properties are important for these processes.

Unfortunately, the work described here fails to deliver on this promise. The authors

describe experiments in which aerosol particles are generated in one of two manners, their size distributions are determined, then a sample of the particles is placed in a Knudsen reactor to measure the uptake of one of several probe gases by the aerosol of interest. Uptake is measured in many instances, however its interpretation here is somewhat unconvincing. I have listed several major problems below, which I feel will require attention by the authors prior to publication of this poaper in the full journal.

1. Much effort is spent in analysing the particle size distribution functions (*assuming spherical particles*) to enable a guess as to the available surface area. This is tricky at best; I would be far more comfortable with a direct measure of the surface areas from BET isotherms. 2. The interpretation in terms of surface reactivity demands that it is only the surface which is probed. This is clearly not so in a number of instances - as pointed out by the authors. Reaction in the bulk could be quite interesting, but this is not even mentioned here. Analysis of uptake curves such as that shown in Fig 4 could yield valuable parameters; I suggest that this could be done. 3. The interpretation also relies (assuming now we are only looking at the surface) on a single reaction per reactive site. Several recent studies on oleic acid (and similar species) have indicated that polymerization occurs in the reactions with oxidizing agents. Can the authors rule this out in their cases as well? 4. It seems that NH2OH reacts only with acidic carbonyl groups, however the results using this probe seem quite different than using TMA. Any comment?

In addition to the comments given above, the manuscript is written in a very convoluted manner, and could easily be shortened (by about half) by removing redundancies and by using direct measures of the available surface area. As well, it would be appropriate to cite some relevent works from other laboratories - uptake by soots is an ongoing concern in many other places nowadays.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 607, 2005.