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Atmospheric Measurement Techniques Discussions

Interactive comment on "Electrodynamic balance–mass spectrometry of single particles as a new platform for atmospheric chemistry research" *by* Adam W. Birdsall et al.

Anonymous Referee #3

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The manuscript demonstrates how the coupling of two well-established techniques - single-particle mass spectrometry and electrodynamic particle trapping - results in a new approach significantly advancing the capabilities of the individual parts. The manuscript is very well and clearly written and can be published without modifications. I have actually no major comments, just two remarks below:

1. A combination of electrodynamic trap and mass spectrometer has been described previously by (Dale et al., 1994), who used laser ablation to ionize the trapped particle. Please give a mention of this work in your review of analytical techniques.

2. The possibility of studying the slow gas-phase chemical reactions in atmospheric

aerosols is given as one of the motivations for this work. Aerosol particles, however, are much smaller in size (typically submicron) than the particles used in your work, so that trapping a particle in the EDB and transferring it into the ionization section might be very difficult. Could you discuss this issue in the outlook section? As a layman's suggestion, wouldn't it be possible to use a linear quadrupole trap to move a train of particles slowly through the reaction zone delivering them one by one into the ablation section coupled to the inlet of a mass spec? Such technique, though applied for optical particle characterization and not for mass spectrometry, has been recently described by (Sivaprakasam et al., 2017).

References:

Dale, J. M., Yang, M., Whitten, W. B. and Ramsey, J. M.: Chemical Characterization of Single Particles by Laser Ablation/Desorption in a Quadrupole Ion Trap Mass Spectrometer, Anal. Chem., 66(20), 3431–3435, doi:10.1021/ac00092a021, 1994.

Sivaprakasam, V., Hart, M. and Eversole, J. D.: Surface Enhanced Raman Spectroscopy of Individual Aerosol Particles, J. Phys. Chem. C, 121, 22326−22334, doi:10.1021/acs.jpcc.7b05310, 2017.

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