

Interactive comment on “Characterization of trace metals with the SP-AMS: detection and quantification” by S. Carbone et al.

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Dear authors,

Regarding surface ionization:

As is already stated in your AMTD manuscript (Carbone et al., 2014), thermal ionization will depend on the ionization potential of the analyte atom or molecule, the temperature of the system, and the electron work function of the material from which the analyte atom or molecule is vaporized (Heumann et al., 1995). Therefore, one might hypothesize that SP-AMS thermal ionization could be significantly different for atmospheric samples than for the samples considered here. Since metals such as iron may be often measured in the atmosphere as metals (e.g. from industrial sources and/or abra-

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sive processes) or light-absorbing dust, the RIEs measured for metal salts mixed with Regal Black (RB) might be significantly different to those observed in the atmosphere. In particular, the work function would be different due to the particle surface being different from RB, and the ionization temperature might change since the metal surface would itself be heated rapidly by the SP-AMS laser.

If additional discussion on whether these effects would make a significant or negligible difference to the observed metal RIEs, this might be very helpful for the interpretation of future SP-AMS results. Perhaps the Saha equation with an estimate of the relevant work functions (e.g. Heumann et al. 1995; Sodha et al., 1975) could be used? Or, more directly, the thermal ionization of pure-metal nanoparticles could be measured as described in Section 2.3.3?

Best regards,

Joel Corbin

References

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Heumann et al., Analyst 120, 1995. doi:10.1039/AN9952001291
Sodha et al., J. Appl. Phys. 46, 3806 (1975). doi:10.1063/1.322167

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