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www.elsevier.com/locate/jaerosci

PII: S0021-8502(17)30173-8
DOI: https://doi.org/10.1016/j.jaerosci.2018.06.007
Reference: AS5303

To appear in: *Journal of Aerosol Science*

Received date: 11 May 2017
Revised date: 18 May 2018
Accepted date: 9 June 2018

Cite this article as: L.A. Álvarez-Trujillo, V. Lazic, J. Moros and J.J. Laserna, Simultaneous Imaging and Emission Spectroscopy for the Laser-Based Remote Probing of Polydisperse Saline Aerosols, *Journal of Aerosol Science,* https://doi.org/10.1016/j.jaerosci.2018.06.007

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Abstract

Atmospheric aerosols are freely-moving multidimensional stochastic systems within a representative volume of air. Light-based techniques has proved to be a reliable and versatile tools for the direct, in-situ, real-time and remote gathering of information from aerosols in the atmosphere. However, acquiring analytical information is not trivial since particulate matter usually exhibits a broad compositional variability and a wide disparity of physical properties. In order to deeply scrutinize the performance of the laser induced plasma analysis of aerosols, here generated at distance of 10 m, side-viewed images of plasmas have been captured concurrently with their collinearly-acquired optical emissions. The plasma was induced by nanosecond laser pulses at a wavelength of 1064 nm on aerosols containing NaCl dissolved in water, and sprayed at different pressures. The photography reveals that the plasma consists of a series of luminous discharges, whose number, spatial distribution, size and luminosity, vary considerably with the particles size and salt concentration. The effects of the abundance and nature of luminous discharges composing the ongoing plasma on the intensity of the characteristic emission lines within the LIBS spectra have been discussed.

Graphical Abstract: