Multielemental analysis in nanoplasmas of isolated particles in an optical trap

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Single particle characterization still constitutes a challenge to contemporary chemical analysis. Considerable effort worldwide is being devoted to conceive experimental strategies providing detection capabilities compatible with the extremely low mass of micro- and nano-particles and the ability to determine the chemical composition of the individual entities. The notion of using optical levitation to trap individual particles was demonstrated in the past century. Recently we have proposed the multielemental analysis of individual nanoparticles in optical traps using LIBS. In this lecture, the fundamentals of optical trapping of nanoparticles in air will be presented. The specific excitation and ionization processes leading to efficient optical detection and an analysis of the photon emission efficiency will be discussed. Finally, some limiting factors involved in our approach and prospective directions for improvement will be presented.