Characterization of size-sorted particulated matter collected on solid substrates by laser-ionization mass spectrometry and laser-induced breakdown spectroscopy

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Direct determination of particulate matter is a huge challenge derived from the inherent heterogeneity in size and shape of the material. In conditions in which the dimensions of the probe are greater than the particle, it can be assumed complete vaporisation/ionisation. As the particle size increases, this percentage falls drastically. Moreover, even under conditions of effective excitation, the composition of the samples (particularly the presence of refractory oxides) significantly alters the dynamic excitation of the particle. In this regard, conventional analytical strategy requires precise control of the excitation conditions in order to overcome the characteristics of each sample enthalpic barriers. Another strategy is the use of femtosecond lasers, in which the best coupling of energy on the sample can increase yields excitement.

This communication compares the results obtained with two excitation sources (5-ns Nd:YAG @266 nm and a 35-fs Ti-Sa@800 nm) and two different detection schemes: time-resolved optical emission spectrometry and time-of-flight mass spectrometry. Figure accompanying the text shows a full spectrum of cations (black trace) and anions (blue trace) generated upon excitation with a laser pulse of 35 fs particle certified floor (Clean Clay Soil 2) of size < 10 μm.