Isolated Nanoparticle Analysis by Laser-Induced Breakdown Spectroscopy

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Isolated Nanoparticle Analysis by Laser-Induced Breakdown Spectroscopy Submitted to symposium X : New frontiers in laser interaction: from hard coatings to smart materials

We propose a method for analyzing the elemental composition of isolated nanoparticles. It is based on Laser-Induced Breakdown Spectroscopy (LIBS). LIBS allows remote specific detection of most of the chemical elements in a sample and at very low concentrations. We propose a new experimental setup in which we perform the laser-particle interaction in vacuum, on a single nanoobject. A small part of the aerosol stream is sampled and driven to an aerodynamic lens system. The latter produces a dense and collimated beam of nanoparticles under vacuum from the atmospheric pressure aerosol flow. The photon signal from the plasma is collected by an UV-compatible optical fiber connected to a spectrograph. As the interaction takes place at low pressure, the photons are emitted only from particles. Unlike previous experiments, the background from interaction with the gaseous component is totally eliminated. Moreover, as the nanoparticle beam is highly collimated, the optical interfaces are not obstructed by particle deposition and the system can be kept running for hours. This method can also be adapted to any particle samples in a stable suspension.