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We propose a method for on-line monitoring of gas phase synthesis of nanoparticles. It is based on Laser-Induced Breakdown Spectroscopy (LIBS). LIBS is a method of chemical analysis that offers many advantages. It allows remote specific detection of most of the chemical elements in a sample and at very low concentrations. This technique was already used to probe the chemical composition stability of SiC nanoparticles during their production by laser pyrolysis. However, sampling stability control difficulties and interface problems between optical elements and particle flow are a drag to its use as an efficient method in continuous-wave mode on high-throughput production plants. Here we propose a new experimental setup for eliminating these difficulties by performing the laser-particle interaction in vacuum. 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 laser-particle interaction takes place at 10^{-3} mbars. 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 wet chemical synthesis techniques or any particle samples in a stable suspension. In this case, the particle suspension is atomized to bring the sample in the aerosol form. The proof of concept is performed with a collimated beam of silicon nanoparticles. With a 20 kHz fiber-laser focused in order to have at least 10 GW/cm^2 intensity on the particle beam, exploitable spectra are recorded at a repetition rate of less than one minute, allowing for continuous-wave or at constant time intervals in-process monitoring of particle chemical composition.