

LIBS Assisted by acoustic levitation sampling: Study of spatial stability of levitated droplets in air and argon

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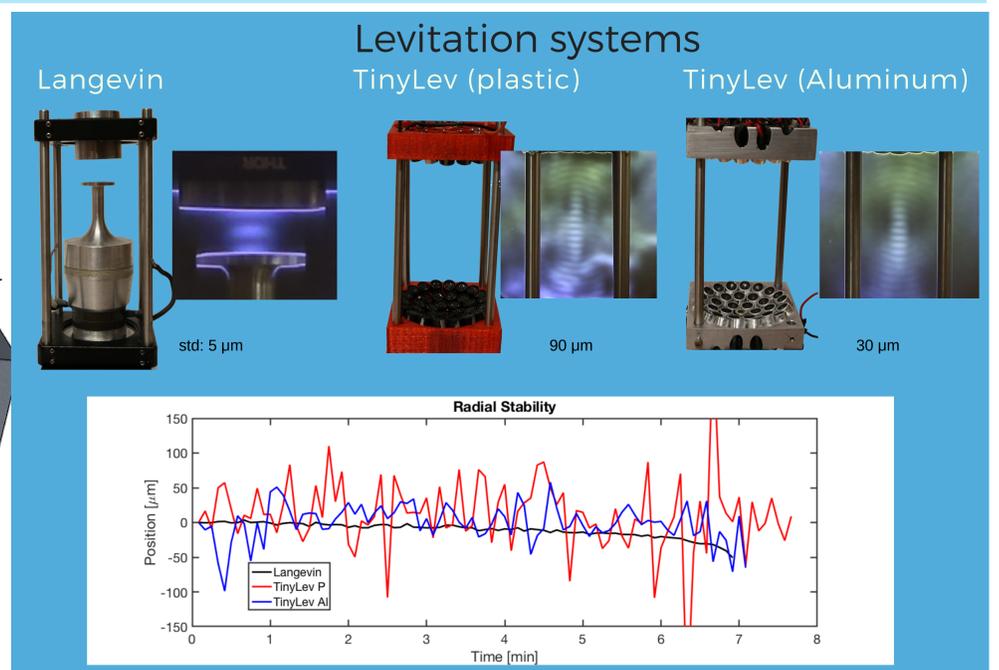
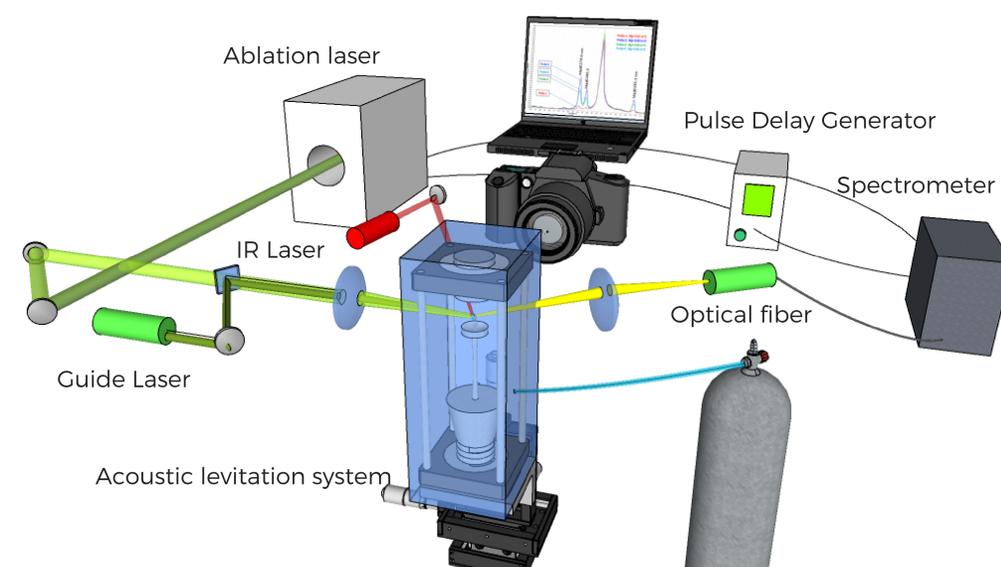
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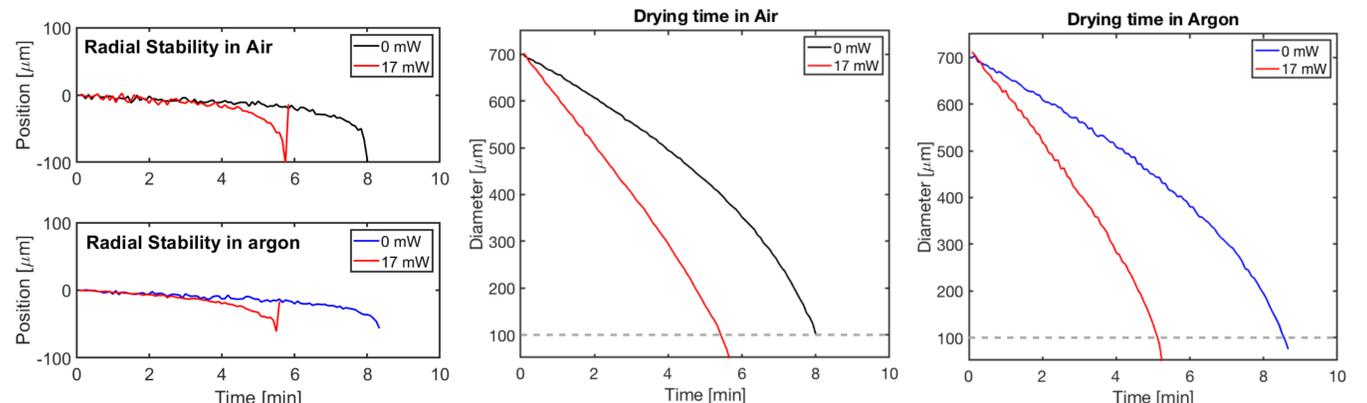
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ABSTRACT: Real-time and multi-elemental analysis for online water monitoring is an important task towards environmental safety, public health and others. We present a novel approach based on LIBS where the liquid sample is levitated by acoustic means. In a previous work,¹ we proved the acoustic levitation is stable enough to guarantee the LIBS signal with an acceptable sensitivity when applying low-pulse energies. However, reproducibility is compromised due to levitation instabilities. In this work we present the contribution of some parameters on spatial stability and the drying times of the levitated droplets. Additionally, we analyzed the effects of argon atmosphere in order to enhance the LIBS signal, to enable the use of simpler instrumentation.

Experimental setup

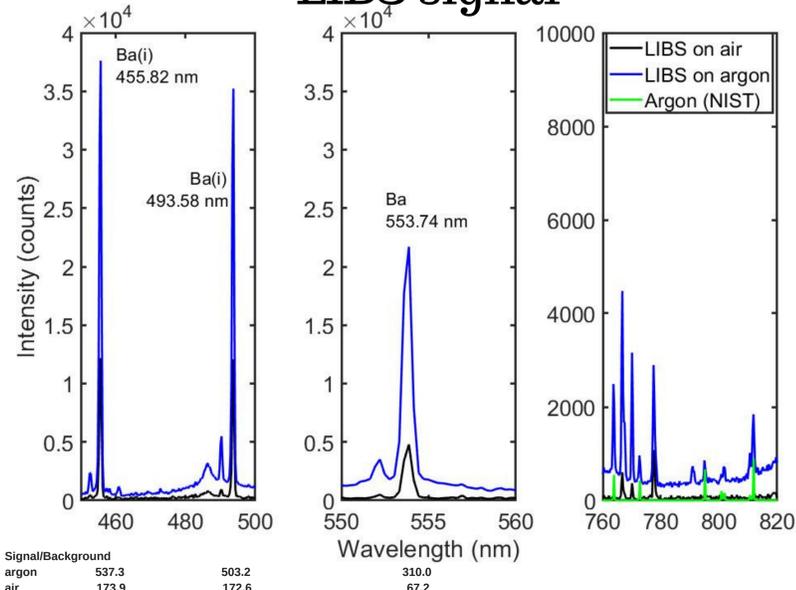


Drying process in Langevin sys. and IR laser



The use of the IR laser diode accelerates the drying process and allows the droplets to reach smaller sizes.

LIBS signal



The TinyLev aluminum plates reduces the heat on the transducers, improving the stability of its acoustic potential. Even so, the Langevin system had a better performance.

The use of the IR laser diode allows greater reconcentration coefficients, due to the smaller sizes of droplets that can be levitated.

The use of argon atmosphere enhances signal to background a factor of 3.5

The presented graphs are results of preliminary analysis of single droplets. As work in the future, statistics of stability, pulse energy and LIBS signal must be made.

1.- V. Contreras, R. Valencia, J. Peralta, et al. Chemical elemental analysis of single acoustic-levitated water droplets by laser-induced breakdown spectroscopy, Optics Letters Vol. 43, (2018) Issue 10, pp. 2260-2263.
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