# Laser induced liquid bead desorption

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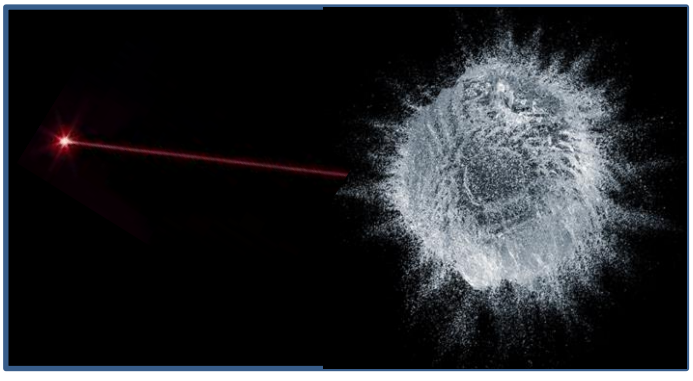
**Keywords :** laser desorption, microdroplets, gas phase, mass spectrometry, biomolecules.

**Context :** The Biomolecules and Spectroscopy team performs structural studies of biomolecules using gas phase physical chemistry technics. In addition to collaborative experiments performed on state-of-the-art devices[1] (infrared multi photon dissociation with free eleectron lasers, ion mobility spectrometry), the team is currently developping an innovative gas phase ion source. This source, unique in France, is based on laser desorption of liquid microdroplets directly under vacuum[2]. It allows to benefit from the numerous advantages of the gas phase (stoechiometric control, trapping and manipulation of ions, interrogation with different spectroscopic structural probes) while preserving biomolecules native structure[3,4].

**Objectives :** The candidate will perform the experimental investigation of the desorption phenomena induced by the interaction of an infrared laser pulse (tuned to water absorption band) with a liquid water microdroplet (50 µm diameter) under vacuum. Underlying mechanisms are poorly undestood (supercritical phase transition, supersonic shock wave…) and the way energy is deposited into the microdroplpet strongly influences the nature and quantity of desorbed species (biomolecules into the droplet). Pulse energy and wavelength effects will be studied using an optical parametric oscillator with a short bandwidth and allowing to get pulse energies higher than 10 mJ. The desorbed species are analysed by time-of-flight mass spectrometry.

**Applicant skills :** experimental liking and skills, basic knowledge in laser physics or in vacuum apparatus.



[1] Nieuwjaer et al. J. Mol. Spec. 383 (2022) 111562.
[2] Morgner et al. Aust. J. Chem 59 (2006) 109.
[3] Peetz et al. *J. Am. Soc. Mass Spectrom.* 30 (2019) 181.
[4] Hellwig et al. *Biochem. Soc. Trans.* 50 (2022) 1057.

**This M2 internship will be followed by a PhD, funded by a targeted doctoral school allowance (secured funding).**