INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	Laboratoire de Physique des Plasmas (LPP)
Website of the Host Laboratory	https://www.lpp.polytechnique.fr/
Research Group	Low-temperature plasmas
Internship Supervisor	David Pai
Internship Subject	In-situ Raman spectroscopy of low-temperature plasma-liquid interfaces
Student's level	☐ Advanced Undergraduate Students (3rd or 4th year) ☒ Master's students (1st or 2nd year) ☐ PhD students
Proposed Duration	☒ 3 months ☐ 4 months ☒ 5 months ☒ 6 months
Prerequisites	Pursuit of a Master's level degree in physics, chemistry, or a related discipline with a background in at least one of the following areas: plasmas, optical spectroscopy, nano-materials, and/or electrochemistry.
Internship description (max. 15 lines)	The chemistry of plasma-activated water (PAW) has been under investigation for an expanding number of potential applications such as the deactivation of airborne respiratory syndrome viruses, bacterial deactivation, agriculture, water treatment, cancer treatment, and nanomaterials synthesis. Strongly non-equilibrium conditions enable the plasma to perform the required processes for these applications in many cases in a single step and without assistance, compared to conventional methods that can require multiple steps, potentially toxic chemical agents (e.g. acids, reducing agents), and/or external heating. A major challenge facing the development of PAW-related applications is the detailed experimental investigation of the plasma-water interfacial region. Liquid-phase diagnostics of the interface are necessary for understanding how the plasma transforms water into PAW and how to achieve the desired outcome for a given application. The objective of internship is to participate in experimental work on the development of Raman spectroscopy as an in situ diagnostic technique for resolving the spatial structure of the liquid side of the plasma-water interface, in terms of its physical/chemical properties and species concentrations. We will focus on plasma-electrochemical (PEC) reactors, composed of an atmospheric-pressure plasma in contact with an aqueous solution acting as an electrode. The project would concern the study of simple aqueous solutions (such as dilute acids or bases) in contact with different plasmas.

The boxes marked with cross implies eligible