Post-doc Position in LaserImplant (H2020)

(Release date: November 20th 2020)

Duration: 18 months, kick-off in January 2021

Host organisation: Laboratoire Hubert Curien (**LabHC**), CNRS UMR 5516, Université Jean Monnet (**UJM**), St-Etienne, France

Background: New miniaturized and smart medical implants are more and more used in all medical fields. A large application area of medical implants are currently dental prostheses – a rapidly growing market in ageing societies. These implants consisting of Ti or a Ti-alloy should provide good and fast osseo-integration into the jaw bone. Opposed to that demand, in other applications (for instance for bone screws and plates), the implants may have to be removed after some months or several years and shall, therefore, not be completely overgrown by the bodies' cells. Hence, a one-step laser-based surface functionalization of implant materials for controlling the cell growth is strongly desired.

The goal of Horizon 2020 project LaserImplant is the cooperation between academia, research centers, laser-processing device developers and implant producers for future development of smart medical implants addressing wide-spread patient's needs in the fields of dental prostheses and screws and plates for bone regeneration. The project activities include to pave the pathway for commercialization of laser-functionalized implants, the exploration of industrial up-scaling strategies, and the dissemination and exploitation of the results.

Objectives: UJM is specialized in laser-material interactions, case-to-case advanced laser processing solutions, biology, and bio-mechano-transductions. Apart from these activities, **UJM** will also take part in the disseminations, exploitations and communications, indeed **UJM** will lead this activity. Within H2020 project LaserImplant consortium, **LabHC**, hence the post-doc fellow, is responsible to the tasks relevant to advanced beam shaping for complex surface patterning. The post-doc fellow will also explore surface structures produced with different laser wavelengths, and different laser pulse temporal shaping, for different surface-cell interactions.

Applicant profile: The successful candidate must be a team player, results-driven, and self-initiator. He/she should hold a doctorate degree in physics / optics / Biology, with a good track record in laser material interactions, especially ultrafast laser processing. A list of key merits is summarized:

- Experience in laser temporal/spatial shaping, and optics design is highly appreciated; to this end, Zemax, and/or OSLO, and/or other ray-tracing programmes would be a plus
- Experience in Gaussian – Tophat conversion would be an asset
- Experience in high hormonic generation would be a pre
- Sufficient skills in material science to ensure a good level of exchange with partnership specialists from other scientific fields and industry

- Programming skills in synchronizing scanners, laser electronics and translation stages are also regarded as a pro
- Knowledge in French (or enthusiasm for learning it) is considered as an advantage.

Practical information:

Hosting laboratory: Hubert Curien laboratory **LabHC**, created in 2006, is a joint research unit (UMR 5516) of Jean Monnet University, Saint-Etienne, the National Research Centre "CNRS", and the Institut d'Optique Graduate School. It is composed of about 240 members who work on scientific topics related to optics, photonics and microwave, computer science, telecom and image. The laboratory has voluntarily been part of projects supported by the National Research Agency (ANR), the University, the CNRS and the region while at the same time developing scientific projects with the PRES Labs. Today **LabHC** has a total of 20 ANR projects in which he is either the pilot or the partner. This represents the majority of all the ANR projects with the University of Saint-Etienne. Furthermore, major emphasis is put on inviting foreign scientists for long or short visits to our Lab. The Lab is also present in several committee programs, in international conferences and in specific European projects in phase with our principal research domains. Asides from science, industrial outreach is also a traditional part of the laboratory activity. The laboratory has in fact been involved in setting up several start-ups.

Associated laboratory**:** human cells behaviours on laser patterned surfaces will be evaluated (by another H2020 LaserImplant post-doc fellow) in **Sainbiose** laboratory. **Sainbiose** (joint research unit between **UJM**, INSERM and Mines Saint-Etienne) studies chronic and aging pathologies of the vascular and osteoarticular systems through cross-functional approach that combines fundamental, technological and clinical research. The expertise of **Sainbiose** lies in Osteoporosis, Osteoarthritis, Bone Substitutes, Biomechanics, Arterial Venous Disease and Coagulation, Pharmacology of Antithrombotics.

Location: both of above-mentioned entities are located in Saint Etienne (also known as "City of Design" by UNESCO), eastern central France. Other academic/industrial partners of the project are also based in the same region of "Rhone-Alpes". Saint Etienne city is of 3-hour's train ride from Paris, or of less than 1 hour from Lyon. It is also near the Pilat massif and the French Alps, close to excellent hiking trails and ski resorts.

Remuneration: net monthly salary 2100~2500€, depending on experience and skills. Public transport compensation and dedicated health care packages will also be available.

Application: Application including at least a motivation letter and CV should be made to the contact person indicated below. Recommendation letter(s) is not obligatory, but would be taken into consideration if provided.

Contact: Dr. *Sedao*, Researcher, Hubert Curien Laboratory

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