Post-Doc Position

Advanced Ultrafast Laser Texturing of Metallic Glass Coatings for Dental Implants

Funding: Région Auvergne-Rhône-Alpes (Partenariat Innovation)

Duration: **12 months, starting march 2027**

Institute: Laboratoire Hubert Curien (UMR CNRS 5516)

Project:

The LUAMID (Advanced Ultrafast Laser Texturing of Metallic Glass Coatings for Dental Implants) project aims to develop and validate advanced ultrafast laser texturing processes for metallic glass coatings on dental implants. Metallic glasses offer promising properties for biomedical applications, including high mechanical strength, corrosion resistance and potential biocompatibility. Combined with laser surface structuring, they could provide new ways to control bacterial adhesion and cell-surface interactions.

A key objective is to **increase the technology readiness level (TRL) of these processes**, moving beyond laboratory-scale demonstrations on planar samples towards their implementation on real dental implants with complex 3D geometries. In close collaboration with one of the **leading companies in the implant market**, the project will address the challenges of transferring the process to industrially relevant conditions, including reproducibility, surface homogeneity and processing throughput. Experiments will be conducted on a high-throughput laser platform shared with the Economic Interest Group **Manutech-USD**.

The work will involve developing advanced laser processing strategies, including circular and complex polarization states, as well as temporal shaping through controlled delays between successive pulses. These approaches will enable the fabrication of functional surface nanostructures with feature sizes down to a few hundred nanometres. A particular challenge will be to maintain precise control of laser parameters, polarization and pulse shape during scanning on complex geometries.

The resulting surfaces will be characterized using techniques such as SEM and AFM. Their antibacterial properties and biocompatibility will be evaluated in collaboration with **our industrial partner**, with the aim of demonstrating the potential of the developed processes for dental implant applications.

Environment

The postdoctoral researcher will join the Laser-Matter Interaction team at Laboratoire Hubert Curien. The team develops experimental and theoretical approaches to ultrashort laser-matter interactions, with a particular focus on surface nanostructuring.

The researcher will have access to femtosecond laser systems, dedicated optical setups for polarization and temporal pulse shaping, and advanced surface characterization facilities (SEM, AFM and complementary techniques). She/He will work on a shared platform at **Manutech-USD** to develop new and advanced laser functionalization setups. The position will involve close interactions with **industrial partners** and **Manutech-USD**, combining academic research with industrial development.

Requirements

The ideal candidate should hold a PhD in physics, optics, photonics or materials science. Experience with ultrafast lasers will be greatly appreciated, especially on laser-matter interaction, laser processing, optical experimental setups and nanoscale surface characterization techniques.

The candidate should demonstrate strong experimental skills, autonomy and good organizational abilities. The ability to work in an interdisciplinary environment and communicate scientific results effectively with academic and industrial partners is essential.

The candidate should also have strong organizational skills to coordinate the different project activities and interactions with Laboratoire Hubert Curien, Manutech-USD and the industrial partner, and to ensure the effective management and follow-up of the project.

How to apply

Interested applicants are invited to send their CVs to:

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