Post-doctoral position in femtosecond transient absorption spectroscopy of organo-metallic molecular precursors for advanced laser photodeposition strategy

LASIRE – UMR8516 CNRS – University of Lille

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Scientific project:

The next generation of micro- and nano- technologies for manufacturing microelectronic, photonic, and electro-mechanical components requires processes that minimize waste of elements which sourcing is environmentally costly. In this context, we aim to develop novel families of photoactive molecular precursors for the laser deposition of metal and metal-oxide nanostructure. A crucial aspect is the development of precursors specifically engineered such that they have a high multi-photonic absorption, high dissociation yield and negligible linear absorption. The objective of this project is to investigate the excited state photodissociation of [M(0)Ln] species, the photo-induced reductive elimination of M(II) bisalkyl type complexes, and the photolability of β-diketonate ($R_1COCHR_3COR_2$) and β-ketoesterate ($R_1COCHR_3COOR_2$) ligands. To achieve this goal, the ultrafast photoreactivity of the complexes will be investigated. Femtosecond pump probe transient absorption in the UV-vis-NIR spectral domains will be carried out. In collaboration with our partners, these results will be analysed to orient the design of novel derivatives, and the optimal conditions for the laser photodeposition.

Scientific environment:

This post-doctoral position is open in the framework of the ANR ACTIVATE consortium constituted by FEMTO-ST, CP2M, UCCS and LASIRE, gathering recognized expertise in the fields of organometallic chemistry, metal deposition, ultrafast laser optics and time-resolved spectroscopy. This will offer to a young researcher a stimulating scientific environment for building its networks in the field of ultrafast photosciences. The position is open in the team PCS of LASIRE, a group composed by 8 permanent researchers from CNRS and University of Lille which is focussing its research on the study of the photophysical and photochemical mechanisms by using ultrafast transient optical spectroscopy. The group is also developing the Ultrafast Spectroscopy facility of Lille, which is part of the national PEPR LUMA ULTRAFAST platform. Specifically, for carrying out this research project, a state-of-the art UV-vis-NIR transient absorption set-up seeded by a tunable 1 kHz, sub-70 fs OPA is available in-house. In addition, nanosecond flash photolysis, luminescence and Raman set-up can complete the characterizations. (ref: *hal-04882724v1* , *hal-02892502v1* , *hal-04678853v1*)

Candidate profile: The applicant should have:

- A PhD diploma obtained within the last two years
- An academic background in the fields of physical-chemistry, kinetics, photochemistry, laser-matter interaction, ultrafast laser optics and spectroscopy

Technical Skills:

- laser pulses generation and characterization
- UV-vis pump-probe spectroscopy
- Spectroscopic data analysis with using standard software and methods of the field
- English speaking and writing for scientific communication and dissemination

Position conditions: 12 months CNRS post-doctoral position, in LASIRE-UMR8516, Bât C8, University of Lille. Brut income 3071.5 €/month