Fabrication and study of micro-architectured ceramics by combining a high resolution 3D printing and soft chemistry

Increasing the design resolution of 3D functional materials is nowadays a great challenge shared by many researchers. In that way, 3D printing is a very promising method to produce oxide-based ceramic objects with complex shapes. Depending on the chemical nature, applications could be many and varied. For example, based on bioglass, 3D architectures can answer needs in biomedicine, like development of new bone implants or prostheses. Based on silica, other architectures could be used as reinforcement agents.

A new process has been recently developed in the Laboratory of Multimaterials and Interfaces (LMI, UMR CNRS 5615). It is now possible to stack layers of materials with a resolution of about a micron, under atmospheric conditions. By far, this resolution is the highest achievable with a 3D printer working with extrusion. A next step would be to combine this process with the sol-gel route to expand the field of possibilities.

The present PhD position is dedicated to combine this advanced 3D process to the sol-gel chemistry in order to first study the properties of the inorganic solution that have then to be adapted to the design and the micro-architecture of the 3D desired object. The PhD student will be in charge of the sol-gel chemistry as well as the fabrication of ceramic objects using the specific 3D printer. The candidates must present good skills in inorganic chemistry and have a knowledge of different physico-chemical characterization techniques. Other skills are welcome. We warmly recommend students who have a scientific curiosity, a desire to work with a team (both at national and international scales) to apply to this PhD offer.

Application:
Please send your CV, a motivation letter and your Master's transcripts to:
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