

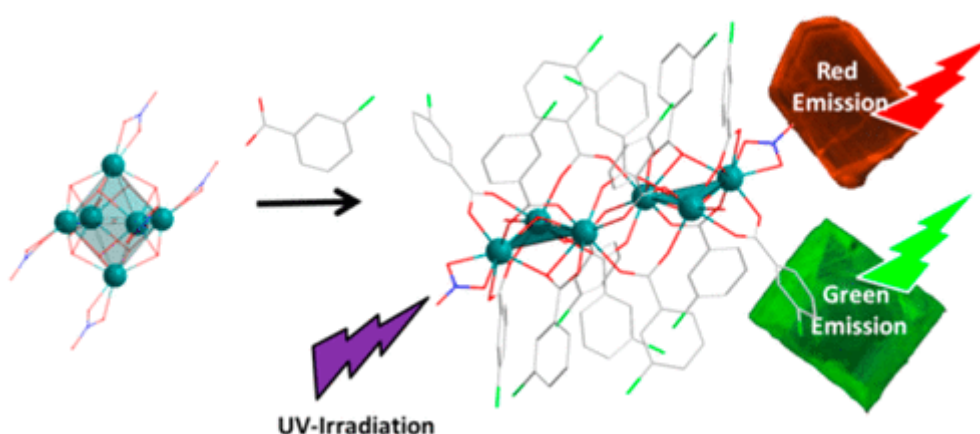
New coordination compounds based on hexanuclear molecular precursors

The supervisor will be Dr. Guillaume Calvez, assistant professor at INSA Rennes. The PhD director will be Pr. Olivier Guillou, working in the same group at INSA Rennes.

The goal of this research work would be to synthesize and characterize new coordination compounds using hexanuclear precursors as secondary building units. The precursors are now well known and the group masters their synthesis (these chemical compounds are under study in the group since more than ten years, see the list of publications below), but their use as precursors for further synthesis must be developed. Indeed some complexes, coordination polymers or nanoaggregates based on these polymetallic complexes have been reported. However, the synthetic process is to date misunderstood and deserves further studies. In the frame of this study the characterizations of the new compounds are multiple, their thermal and chemical stability and their photo-physical properties in particular should be studied.

During this PhD, we should ask for some collaborations, the other member of the group of course for magnetic, structural, time-resolved luminescence studies for example. Any other collaboration that would offer a better insight in the sometimes tough to characterized objects will be welcome.

The PhD candidate should master the basics of usual chemistry techniques but also basic knowledge on previously cited characterization techniques would be welcome, together with a willing to learn English and French to be able to easily interact with everybody in the group.



Some publications directly related to the subject

8. Hetero-hexalanthanide Complexes: A New Synthetic Strategy for Molecular Thermometric Probes Haiyun Yao, Guillaume Calvez, Carole Daiguebonne, Kevin Bernot, Yan Suffren, Olivier Guillou *Inorganic Chemistry*, 2019, 58, 16180-16193
7. Hexalanthanide Complexes as Molecular Precursors: Synthesis, Crystal Structure, and Luminescent and Magnetic Properties Haiyun Yao, Guillaume Calvez, Carole Daiguebonne, Kevin Bernot, Yan Suffren, Marin Puget, Christophe Lescop, Olivier Guillou *Inorganic Chemistry*, 2017, 56 (23), 14632-14642
6. Lanthanide-based hexa-nuclear complexes and their use as molecular precursors Guillaume Calvez, François Le Natur, Carole Daiguebonne, Kevin Bernot, Yan Suffren, Olivier Guillou *Coordination Chemistry Reviews*, 2017, 340, 134-153
5. Coordination Polymers Based on Heterohexanuclear Rare Earth Complexes: Toward Independent Luminescence Brightness and Color Tuning François Le Natur, Guillaume Calvez, Carole Daiguebonne, Olivier Guillou, Kevin Bernot, James Ledoux, Laurent Le Pollès, Claire Roiland *Inorganic Chemistry*, 2013, 52 (11), 6720-6730
4. Unprecedented Lanthanide-Containing Coordination Polymers Constructed from Hexanuclear Molecular Building Blocks: $\{[Ln_6O(OH)_8](NO_3)_2(bdc)(Hbdc)_2 \cdot 2NO_3 \cdot H_2bdc]\}_\infty$ Guillaume Calvez, Carole Daiguebonne, Olivier Guillou *Inorganic Chemistry*, 2011, 50 (7), 2851-2858
3. Lanthanide-based hexanuclear complexes usable as molecular precursors for new hybrid materials Guillaume Calvez, Carole Daiguebonne, Olivier Guillou, Tanja Pott, Philippe Méléard, Florence Le Dret *Comptes Rendus Chimie*, 2010, 13, 715-730
2. A New Series of Anhydrous Lanthanide-Based Octahedral Hexanuclear Complexes Guillaume Calvez, Carole Daiguebonne, Olivier Guillou, Florence Le Dret *European Journal of Inorganic Chemistry*, 2009, (21), 3172-3178
1. Octahedral hexanuclear complexes involving light lanthanide ions Guillaume Calvez, Olivier Guillou, Carole Daiguebonne, Pierre-Emmanuel Car, Vincent Guillerm, Yves Gérault, Florence Le Dret, Nathalie Mahé *Inorganica Chimica Acta*, 2008, 361, 2349-2356