

<b>Title</b>	<b>Development of new luminescent thermometers</b>
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### Project description:

Sensing and temperature measurements are crucial needs for countless scientific investigations and technological developments in a large variety of fields as electronic for optical devices, nano-medicine, micro-fluidics or optoelectronic. Since last few years, many efforts have been made in the synthesis of novel non-invasive, luminescence (PL) thermometers as organic, inorganic and hybrid systems that show a dependence of their PL properties on temperature. To this regards, particularly appealing are ratiometric, self-referencing temperature sensors based on the intensity ratios of two emission transitions.

The proposed research project will be focused on the development of new molecular thermometers based on luminescent d- and f-ion complexes. In particular, we will consider: *i*) coordination compounds and metallo-supramolecular architectures; *ii*) inorganic host-guest systems, where d- and f-ions are introduced as guests in suitable oxide based matrices; *iii*) hybrid materials where functional molecules are synergically coupled with inorganic substrates even as surface monolayers.

The understanding of energy transfer mechanisms determining thermal sensitivity is a current topic in the synthesis of molecular thermometers. This project will study the correlations between the thermal modulation of the d- and f- ions luminescence, the ligands coordinated to the metal center and the matrices.

During the three years PhD school, the skills that will be acquired are summarized as follows:

- Synthesis of organic compounds suitable for the coordination of the metal centers and able to generate highly luminescent complexes also exploiting sensitized emission;
- Synthesis of coordination driven systems based on d- and f-ions;
- Synthesis of hybrid materials mainly in form of thin films (dip-, spin- and spray-coating);
- Characterization of molecular systems and materials through: X-ray Diffraction (powder and single crystal), X-ray Photoelectron Spectroscopy, Scanning Electron Microscopy, Photoluminescence.

### Collaborations/Network:

Prof. T.K. Sham, University of Western Ontario, Canada

Prof. D. Belli Dell'Amico, Prof. L. Labella, University of Pisa

Dr. R. Seraglia, ICMATE CNR