



Internship Proposal 2021 – 2022

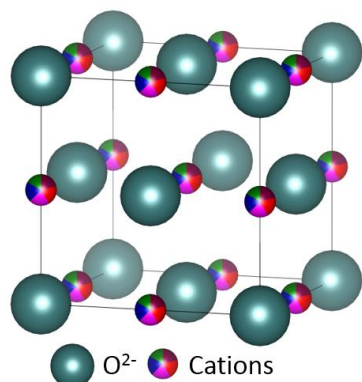
1st year master student (or equivalent) in materials science

New High-Entropy Oxides: Synthesis and Functional Properties Measurement

The high-entropy oxides are a new family of materials described for the first time by Rost *et al.* in 2015 (*Nat. Commun.*, 6, 2015 8485). These materials are made of at least 5 cations with concentration close to equimolar, randomly distributed in the cationic sublattice of the crystal structure. Due to the complex structure, the entropy of configuration is large enough to stabilize the material. The HEOx are usually synthesized by quench at high temperature (>800°C).

Since the discovery of these materials, a wide variety of compounds with various structures have been proposed. Some HEOx have interesting physical properties (dielectric constants, ionic conductivities, magnetic properties), opening many application perspectives. The research on HEOx is still in its early stage and the possibilities of cations combination are large enough to expect new discoveries.

The objectives of this internship are to study a new family of HEOx. Various cations combinations will be studied to better understand the effects of chemical composition on the physical properties. This internship will be divided into 4 tasks:



- **Solid-state synthesis** of HEOx (thermal treatment under controlled atmosphere)
- **Chemical and structural characterization** (electronic microscopy, X-ray diffraction...)
- Study of the **thermal stability** of the materials
- **Functional properties measurements** (magnetic, electrical ...)

The candidate will be a **1st year master student (or equivalent) in materials science**. He / She will be able to work in an experimental research environment. He / She will have good skills in oral and writing to be able to discuss about the results.

The candidate will be integrated into the ICMMO SP2M team and will have access to the instrumental platform of the institute. Depending on the quality of the results, they may be used in international scientific articles.

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