



Development of an innovative experimental approach combining synthesis and *in situ* studies for the discovery of new inorganic sulfides for magnetocaloric applications

CNRS post-doctoral researcher position (7 months) at the Institute of Chemical Sciences of Rennes, University of Rennes 1

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Keywords: Solid-state chemistry and physics, Low temperature synthesis, *In situ* studies, Sulfides, Magnetocaloric materials, Crystal chemistry, Thermal analysis, Spectroscopy

Subject

Solid-state synthesis in sealed silica tubes is one of the most popular methods for the production of inorganic ceramics. Nevertheless, the determination of the best synthesis conditions is a trial-and-error process that generally requires many experiments, varying temperature and duration time. *In situ* studies of the successive chemical reactions occurring during the synthesis of a polycrystalline sample by thermal analysis, diffraction and spectroscopy techniques can be powerful tools to determine the reaction pathways, allowing to reduce considerably the number of trials and to optimize the synthesis conditions.¹

On the other hand, the use of soft synthesis conditions is an alternative approach for the stabilization of new inorganic compounds that cannot be obtained by high temperature synthesis route commonly used in solid-state chemistry.² This was largely demonstrated in tungsten cluster halide chemistry with the discovery of large number of new inorganic compounds with low nuclearity.³

This post-doctoral position focuses on the synthesis and characterization of new inorganic 3d transition metal sulfides for magnetocaloric applications. The aim is to develop an innovative experimental approach combining low temperature synthesis and *in situ* studies by thermal analysis, diffraction and/or spectroscopy techniques in order to discover new compounds and to determine their crystal structures and potential as magnetocaloric materials.

To reach this ambitious objective, the post-doctoral researcher will develop an approach using the synthesis and characterization techniques and apparatus available at the institute, including many synthesis devices of bulk materials, TGA/DSC apparatus, single-crystal and powder X-ray diffractometers, SEM, TEM, PPMS, SQUID ...⁴

Candidate profile

The candidate must have a PhD thesis in chemistry, solid-state chemistry, materials chemistry or materials science. She/he is be motivated by fundamental research, well organized, meticulous and

interested in solid-state chemistry and physics. Particular attention will be paid to applications from candidate with experience on inorganic sulfide materials, structural characterizations, magnetic characterizations and/or spectroscopies.

Practical aspects

This CNRS post-doctoral position, of a total duration times of 7 months, at the Institute of Chemical Sciences of Rennes will starts in December 2021. The gross monthly salary will be 2600 to 3700 euros depending of the candidate's experience. Note that ISCR is an academic research laboratory in restricted regime zone requiring the needs of a ZRR approval. The candidates have to deposit their cover letter, extended CV, recommendation letters and copy of their PhD thesis diploma on the website <https://emploi.cnrs.fr/Offres/CDD/UMR6226-PIELEM-002/Default.aspx?lang=EN>.

Application open until 12/11/2021

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