



COLLÈGE
DE FRANCE
—1530—



PhD positions in nanomaterials synthesis and solid-state chemistry opened in the frame of an ERC consolidator project

Topic: Chemistry of materials and nanomaterials, energy conversion & catalysis

Location: Sorbonne Université, Paris center, France

Host institution: Centre National de la Recherche Scientifique (CNRS)

Supervisor / Contact: David PORTEHAULT

Research webpage: <https://www.lcmcp.cnrs.fr/sites/david-portehault/>

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Starting date: flexible, from September 2020

Topic: Two PhD positions are opened in the frame of the ERC Consolidator project GENESIS "Geo-inspired pathways towards nanoparticle-based metastable solids". The goal is to develop a synthesis methodology at the edge of nanosciences and solid-state chemistry to discover new inorganic solids. The project fits in the overall aim of the team (see research webpage above) dedicated to the synthesis of nanomaterials based on solids never reported in this size range, in order to unveil new structure-nanostructure-property relationships.¹⁻³ The project focuses on metallic compounds of boron, phosphorus and/or silicon, which encompass very scarce solids. We anticipate that the new solids emerging from our approach will exhibit high performances in (electro)catalysis for energy conversion and CO₂ conversion. The general strategy consists in using nanoparticles as reagents in geologically relevant conditions to trigger a new range of chemical reactions. The **PhD students will take in charge the core aspect of synthesis and will characterize the resulting materials**. They will also take part in mechanistic studies through the development of *in situ* techniques.

- 1 D. Portehault, S. Delacroix, G. Gouget, R. Grosjean and T.-H.-C. Chan-Chang, *Acc. Chem. Res.*, 2018, **51**, 930.
- 2 J. Besnardiere, B. Ma, A. Torres-Pardo, G. Wallez, H. Kabbour, J. M. González-Calbet, H. J. Von Bardeleben, B. Fleury, V. Buissette, C. Sanchez, T. Le Mercier, S. Cassaignon and D. Portehault, *Nat. Commun.*, 2019, **10**, 327.
- 3 N. Ortiz Peña, D. Ihiwakrim, M. Han, B. Lassalle-Kaiser, S. Carenco, C. Sanchez, C. Laberty-Robert, D. Portehault and O. Ersen, *ACS Nano*, 2019, **13**, 11372.

Required skills: The candidates should combine a good academic track record with strong dedication for experimental research. She/He should be proficient in materials science, materials synthesis and characterization. Profiles showing early skills in liquid-phase colloidal synthesis and/or solid-state synthesis, characterization of nanoparticles and solids will be particularly considered. During the PhD work, the researcher will acquire an expertise in liquid-phase nanomaterials synthesis and in materials characterization by X-ray diffraction, electron microscopy, solid-state NMR, synchrotron radiation-based X-ray scattering and absorption, electrochemistry and catalytic measurements. She/He should be keen to work in a collaborative and international team, and have a good level of English (written and spoken). She/He will take an active part to weekly group meetings and to lab meetings.

Application modalities: Informal inquiries are welcome. PhD appointments in France are 3 years. Candidates should provide a CV, a report of their **last grades/ranks**, the name and email address of **at least 2 references**. The grant is competitive, covers social security and is compatible with teaching to undergraduate classes.

