*Open position:* **Doctoral Student**
**Bioscience and Biotechnology Institute of Aix Marseille**

*Subject:* **High-throughput syntheses and characterizations of magnetic iron oxides**

The institute focuses on interdisciplinary research in the field of environmental sciences, biotechnology, and biofuel. In particular, the team of molecular and environmental microbiology attempts to understand how a magnetic iron oxide, magnetite, can be formed synthetically and by microorganisms, and how such nanoparticles can be used in medical applications. In this context, the group working on (bio)mineralization invites applications for a:

**Doctoral Student (3 years position)**

Magnetic iron oxides, in particular magnetite ($Fe_3O_4$,$Fe(II)Fe(III)_2O_4$), are interesting because they are made of non-critical materials, easily recyclable, biocompatible, and find theranostic applications in biotechnologies (magnetic hyperthermia, contrast agent for MRI, tracer for Magnetic Particle Imaging). The magnetic properties of the synthesized materials are critical for their applications, these properties being governed by mineralogy, dimension and morphology. A sustainable synthetic pathway to monodisperse magnetite nanoparticles is however lacking.

We propose here to establish a combined high-throughput synthesis / high-throughput characterization for the rapid discovery of the conditions leading to the optimal magnetite. The candidate will use a pipetting robot classically dedicated to structural biology to test a wide range of physico-chemical conditions of the synthesis parameters space, including iron concentration, Fe(II)/Fe(III) ratio, pH, and biomacromolar additives. The syntheses will be done in aqueous solutions in 200 µL 96-well plates in a directed or combinatorial manner. The student will characterize the materials, focusing on Synchrotron Small Angle X-ray Scattering (SAXS) and X-ray Diffraction to determine particle crystallography, size and morphology. We aim at developing an automated platform analyzing the 96 samples at 1 min / sample. Key will be to develop an automated data analysis system to obtain the parameters of interest at the same pace. The project will be performed in collaboration with David Carrière at NIMBE, another CEA Lab, where a large part of the characterization effort will be pursued.

*Qualification:*
Candidates should have a Master degree in chemistry, physics, nanotechnology, materials science or equivalent. Proficient English is required. Good theoretical and practical skills in the lab are expected. Skills in synthetic approaches, SAXS, electron microscopy and/or XRD will be highly appreciated.

*Recent papers on the subject:*
Baumgartner J. *et al.*, 2020, NanoLetters, 20: 5001-5007.
Xiouras C. *et al.*, 2022, Chem. Rev., 122: 13006-13042.

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*Documents:* please include CV, publications' list, motivation letter and at least 2 names for reference letters to your application