

## Ph.D grant from A\*MIDEX in Marseille

We are currently looking for excellent and highly motivated Ph.D candidates for a three-year French scholarship at Aix Marseille Université. Candidates should have a strong expertise in Physical Chemistry and/or Coordination chemistry. Candidates with additional expertise in protein chemistry and biochemistry are highly encouraged.

Deadline for starting: fall 2015.

Salary : *ca.* 1680 €/month (net salary *ca.* 1360 € / month)

### Research project

Obtaining accurate and relevant structural data of a macromolecule is an important step towards the understanding of the chemical mechanisms involved in the biological functions and is therefore an essential knowledge for pharmaceutical and biotechnological applications. Proteins are dynamic entities that possess an inherent flexibility, a fundamental property that allows them to function through molecular interactions with other molecules (either substrates, cofactors or proteins). A powerful technique to study dynamics of proteins and to monitor structural transitions is the **Site-Directed Spin Labeling** (SDSL) followed by **Electron Paramagnetic Resonance** (EPR). It is based on the insertion of a paramagnetic label (usually a nitroxide radical) at a selected site of a protein, either on a native residue or on a specific residue introduced by site-directed mutagenesis, and its subsequent analysis by EPR spectroscopy. SDSL-EPR has been proven to be a useful tool to gain structural and dynamic information on many biological systems addressing various questions for example on: folding events of disordered proteins or conformational changes of folded protein, protein-protein interactions, protein-membrane interactions, as well as on RNA.

This project is centered on exploring the structure and dynamics of a **non heme Fe(II) containing enzyme** using SDSL-EPR. In addition, one innovating aim of the project is to get structural information both *in vitro* and *in cell*. The candidate will therefore be involved in the production of the proteins, the chemical modification steps to introduce the spin labels, the characterization of the labeled proteins and the EPR studies. This project relies on the strong collaboration between two teams of Aix Marseille University: i) the Biosciences group of iSm2 (UMR 7313 CNRS/Aix Marseille Université) that has a strong expertise in the field of metal-containing enzymes and ii) the BIP (UMR 7281 CNRS/Aix Marseille Université) that has a longstanding expertise in the application of EPR spectroscopy in particular for studying metalloproteins and developing original SDSL-EPR approaches. The thesis will therefore be co-directed by Dr. A. Jalila Simaan (iSm2) and Prof. Valérie Belle (BIP).

This project is also strengthened by the multidisciplinary EPR center of Aix Marseille, one of the most important EPR centers of the French EPR network (TGE-RPE).

### Application:

please send by e-mail:

- your CV
- a letter of motivation
- transcripts of master and undergraduate studies,
- at least 1 recommendation letter
- a master thesis abstract

### Contact details:

#### Dr. A. Jalila Simaan

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#### Prof. Valérie Belle

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### Location

The PhD student will be located in laboratories of Aix Marseille Université, the largest university in France with approximately 70.000 students.

Marseille is the capital of Provence region. Located on the Mediterranean Sea, it offers unique sceneries including the National Park of the Calanques, its fiords and climbing facilities. It is also at *ca.* 2 hours by car from the Alps Mountains and the hiking or ski facilities.

### Selected publications

- Photoinduced Multi-Electron Transfer to a Multicopper Oxidase Resulting in Dioxygen Reduction into Water. A. Jalila Simaan, Yasmina Mekmouche, Christian Herrero, Pierre Moreno, Ally Aukauloo, Jacques A. Delaire, Marius Réglie, Thierry Tron, *Chem. Eur. J.*, **2011**, *17*, 11743-11746
- "1-Aminocyclopropane-1-carboxylic acid oxidase: insight into cofactor binding from experimental and theoretical studies" Brisson L, El Bakkali-Taheri N, Giorgi M, Fadel A, Kaizer J, Réglie M, Tron T, Ajandouz EH, Simaan AJ, 2012, *J Biol Inorg Chem*, **2012**, *17*, 939–949
- "Visible Light-Driven O<sub>2</sub> Reduction by a Porphyrin-Laccase System" Lazarides T, Sazanovich I, Simaan AJ, Kafentzi MC, Delor M, Mekmouche Y, Faure B, Réglie M, Weinstein J, Coutsolelos A, Tron T. *J Am Chem Soc* **2013**, *123*, 5824
- Enlarging the panoply of SDSL-EPR: sensitive and selective spin-labeling of tyrosine using an isoindoline-based nitroxide, Mileo E., Etienne E., Martinho M., Lebrun R., Roubaud V., Tordo P., Gontero B., Guigliarelli B., Marque S.R.A. and Belle V., *Bioconjugate Chemistry*, **2013**, *24*, 1110-1117.
- Diversification of EPR signatures in Site directed spin labeling using a  $\beta$ -phosphorylated nitroxide, Le Breton N., Martinho M., Kabytaev K., Topin J., Mileo E., Blocquel D., Habchi J., Longhi S., Rockenbauer A., Golebiowski J., Guigliarelli B., Marque S.R.A., and Belle V., *PCCP*, **2014**, *16* (9), 4202 - 4209.
- « Tyrosine-Targeted Spin Labeling and EPR Spectroscopy: An Alternative Strategy for Studying Structural Transitions in Proteins » Lorenzi M., Puppo C., Lebrun R., Lignon S., Roubaud V., Martinho M., Mileo M., Tordo P., Marque S. R. A., Gontero B., Guigliarelli B., Belle, V. *Angew. Chem. Int. Ed.*, **2011**, *50*, 9108-9111.