



phD Proposal in Grenoble

**Title: Metal complexes for the recognition of phospholipids of biological interests: synthesis and characterizations**

**Summary** : This project involves the design and synthesis of metal complexes as receptors that recognize and specifically bind phosphatidylserine (PS), a membrane phospholipid, exhibited at the surface of membrane microvesicles (MVs). The project also include the physicochemical characterization of the interaction between the coordination complexes and PS.

**Description** : This project involves the design and synthesis of metal complexes as receptors that recognize and specifically bind phosphatidylserine (PS), a membrane phospholipid, exhibited at the surface of membrane microvesicles (MVs). This PhD is part of a global project on the development of new sensors of membrane microvesicles (MVs) with metal complexes. MVs are expelled into the blood by cells in response to stimuli (inflammatory, infectious, etc.) and are therefore biomarkers of several pathologies such as cardiovascular accidents and cerebrovascular. MVs expose on their surface phosphatidylserine (PS), negatively charged, normally located in the inner leaflet of the cell membrane. We thus propose the capture of MVs through the interaction metal complexes/ PS.

A first generation of complexes capable of recognizing the MVs was prepared. In order to optimize this type of system, understanding and quantifying the mechanisms of recognition with the phospholipids present in biological membranes is now an indispensable step. In consequence, the main goal is the characterization of the interactions between the bimetallic center and the considered phospholipids. The studies will be carried out in solution and in supported phase using phospholipids in organized structures of increasing complexity (monomers, vesicles, MVs). Thus, the parameters (geometry of the coordination, charge, affinity, ...) governing the interactions will be determined. Synthesis of complexes (zinc and copper) for immobilization on solid surfaces are also a part of this project.

**Keywords** : Bio-inorganic chemistry, Zn and Cu complexes, Physico-chemistry of interactions in solution and at the interfaces, biomolecular recognition.

**Background and skills expected:** He/She must have a background in chemistry with a focus on physicochemical characterizations and interest in biological problematic. The candidate will be implicated in a multidisciplinary project combining: 1) Organic and inorganic synthesis (preparation and characterization of ligands and complexes + characterizations by NMR, UV-Vis, RPE... ); 2) Physicochemical measurements in solution (UV-Vis and fluorescence spectroscopies, <sup>31</sup>P NMR, ...) and on supported phase after immobilization (surface plasmon resonance (SPR), quartz crystal microbalance (QCM-D), bilayer interferometry (BLI)..).

**Location** : Laboratory : DCM (Département de Chimie Moléculaire) UMR 5250, Grenoble, France (**Web-page** : <http://dcm.ujf-grenoble.fr/DCM-SITE/DCM/>)

Teams: **Cire** and **i2bm**

**Application to:** C. Belle (HDR)/A. Van der Heyden ; **Tel** : 04 76 51 78 38/ 04 56 52 08 14

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with: 1) Cover letter (max. one page) , 2)CV , 3) Transcript of academic records, 4) Letters of recommendation or contact details for potential referees

A grant funded by an ANR program is secured. Nevertheless we asked to the candidate to do an application to the Doctoral School of Chemistry and Life Sciences of Grenoble (EDSCV- <http://edcsv.ujf-grenoble.fr/>) for a PhD research grant -The deadline is April 7<sup>th</sup> 2017.