

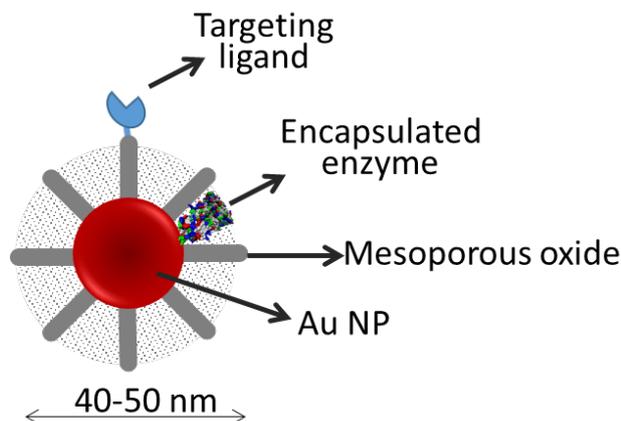
Bourse de thèse

Multi-Functional nanoparticles for controlled enzyme delivery

Joint PhD thesis between University of Buenos Aires and University of Grenoble Alpes

Thesis supervisors: S. Aldabe-Bilmes (Univ Buenos Aires, ARG) X. Cattoën and Y. Roupioz (Univ Grenoble Alpes, FR)

Administration of a labile biomolecule entrapped in a nanocarrier, ranging from soft supramolecular structures to hard inorganic nanoparticles (NPs), not only prevents its loss of function by degradation or denaturation, but also modulates the pharmacodynamics and pharmacokinetics, minimizing undesirable side effects. The aim of this project is the design of rigid nanoparticles as enzymes' carrier and delivery systems. We will focus on nanoparticles able to cross the cell membrane, with anchored targeting molecules and self-monitoring of enzyme inclusion and delivery by their interaction with light. In particular, we will explore composite particles comprising Au and nanothermometer cores embedded in mesoporous silica with large pores.



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We will first develop the synthesis of such multifunctional nanoparticles using sol-gel techniques in solution. Indeed, simple mesoporous silica nanoparticles (MSNPs) with large pores have been prepared in scarce reports in the literature, while Au@MSNP have been also scarcely studied. The insertion of both Au and nanothermometer particles in MSNPs constitutes an interesting challenge as it would enable not only the loading and release of enzymes within the pores, but also the monitoring of the local temperature under plasmonic excitation. We will then study the loading and delivery of various enzymes in these NPs under plasmonic excitation. The non-covalent loading of enzymes will be performed after fine-tuning of the surface potential of the MSNPs. The release of fluorescent proteins will be then performed in solution and *in vitro* on cell cultures.

This project gathers researchers from the University of Buenos Aires and from two laboratories at Univ Grenoble Alpes (Inst Néel and SyMMES). The PhD studies will be performed both in Buenos Aires (Argentina) and Grenoble (France). 18 months of the studies will take place in Grenoble through an IDEX grant. 18 months will take place in Buenos Aires, with a gross salary indexed on the CONICET PhD salaries. A good understanding of both Spanish and English is required.

Starting date: between january and april 2020 :

Scholarship: 1768 €/month*18months (Grenoble); >24600 ARS*18months (Buenos Aires)

Duration: 36 months

Required skills: synthesis and functionalization of materials; characterization of materials, basics knowledge in biology. Spanish, English.

Application deadline: October 1st, 2019. Applicants will have to send an application letter in English and attach: - Their last diploma, - Their CV - A short presentation of their scientific project (2 to 3 pages max) - Letters of recommendation are welcome.

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Plus d'informations sur : <http://neel.cnrs.fr>