

**Postdoctoral Research Associate position within a France-USA collaborative Project funded by A\*MIDEX.**

*DeNovoCatalysts*, an international collaborative Project (France-USA) funded by A\*MIDEX, the Aix-Marseille University Foundation, aims to develop self-assembling and water-soluble artificial mini-proteins with bioinspired heme&Trp redox cofactors for targeted catalysis, and resulting in novel versatile catalysts with enhanced reactivity for medical and/or environmental applications. Such mini-catalysts are inspired on natural metalloproteins in which their reactivity is expanded by the concerted chemistry of transition metals and protein-based radicals. Our bioinspired artificial catalysts will be conceived and characterized as *in vitro* tunable model systems for understanding better the molecular determinants underlying natural catalytic strategies of drug-target heme enzymes and their bioresistance. Moreover, we will target challenging *in vivo* applications by developing the heme&Trp artificial catalysts for *in-cell* reactivity (bacterial culture or bacteria infected cells), thus emulating KatGs (His-ligated heme enzymes; pro-drug activation) or cyt P450 oxygenases (Cys-ligated heme enzymes; selective oxidation of inert C-H bonds). Developing artificial catalysts with a Heme&Trp as redox cofactor for in-cell reactivity to replace KatG in the activation of INH is unprecedented. Our approach of engineering one (or more) redox-active Trp(s) resulting in controlled Trp radical(s) as substrate oxidizing site(s) and/or electron transfer (as in KatGs natural enzymes [1]) relies on our recently developed de novo heme-only miniature functional proteins, using self-assembling  $\alpha$ -helical scaffolds [2].

We are looking for a highly motivated protein chemist, with a PhD in Chemistry or Physics and a strong background in magnetic and optical spectroscopies, excellent communication skills and being eager to work collaboratively in our multidisciplinary research project (Bioinorganic Chemistry, Biophysics, molecular/cell Biology), to undertake a PDRA position of 18 months (renewable based on common agreement). Competitive salary will be defined by Aix-Marseille University's salary grid and considering previous research experience. The postdoctoral Researcher will work within the collaborative Research Project "DeNovoCatalysts" between Dr Anabella Ivancich (Research Unit UMR 7281, CNRS & Aix-Marseille University, Marseille, France) and Prof. Vincent L. Pecoraro (Department of Chemistry, University of Michigan, Ann Arbor, USA). Working missions to the USA lab will be included in the PDRA's work plan.

The PDRA candidate is expected to actively take part in the design of the artificial heme-binding catalysts prior to the characterization of the binding mode(s) of the heme cofactor by using continuous wave and pulsed Electron Paramagnetic Resonance spectroscopy (HYSCORE, DEER), and of their catalytic reactivities (identification of reactive intermediates) also using stopped-flow UV-Vis electronic absorption spectroscopy and spectroelectrochemistry. Both *in vitro* and *in cell* studies may be performed. Experience on either natural or artificial heme enzymes, derived from prior research work at PhD or PDRA level will be highly appreciated.

Applications (including a detailed CV and two letter(s) of recommendation) should be sent by email to Dr Anabella Ivancich ([aivancich@imm.cnrs.fr](mailto:aivancich@imm.cnrs.fr)) before November 26<sup>th</sup> (noon). Inquires can be also address to A. Ivancich.

1. (a) Singh, R., Switala, J., Loewen, P.C., **Ivancich, A.\***. *J. Am. Chem. Soc.* **2007** 129, 15954-15963. (b) Colin, J., Wiseman, B., Switala, J., Loewen, P. C., **Ivancich, A.\*** *J. Am. Chem. Soc.* **2009** 131, 8557-8563.2.

2. Koebe, K.J., Kühl, T., Lojou, E., Demeler, B., Schoepp-Cothenet, B., Iranzo, O., Pecoraro, V.L.\* , **Ivancich, A.\*** (2021) *Angew. Chem. Int. Ed.* **60**, 3974-3978.