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 [1]. Our bioinspired artificial catalysts are being 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, 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). Our approach of engineering redox-active Trp(s) resulting in controlled Trp radical(s) as substrate oxidizing site(s) and/or electron transfer relays (as in KatGs natural enzymes [1]) relies on our currently developed *de novo* heme-only functional proteins, using self-assembling α-helical scaffolds [2].

We are looking for a highly motivated biochemist, with a PhD in Biochemistry, Chemistry or Physics, and a strong background in protein chemistry (including metalloprotein expression and purification), metalloenzymes catalysis and spectroscopy, 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 two years (24 months). The salary will be defined by Aix-Marseille University's salary grid and considering previous postdoctoral experience. The AMIDEX International funds require that the candidate would not have obtained his/her PhD Diploma from Aix-Marseille University. The PDRA will work within the collaborative Research Project "DeNovoCatalysts" between Dr. Anabella Ivancich (Research Unit UMR 7281, CNRS & Aix Marseille University, Marseille, France), Dr. Stéphane Canaan (Research Unit UMR 7255, CNRS & Aix Marseille University, Marseille, France) and Prof. Vincent L. Pecoraro (Department of Chemistry, University of Michigan, Ann Arbor, USA). The proposed starting time for the contract is as early as April 2026, yet later dates could be considered if needed (please specifyyour time constrains in your motivation letter).

The PDRA candidate is expected to actively take part in the expression and purification of artificial heme-binding proteins. Characterization *in vitro* (binding modes of the heme cofactor and catalytic reactivities by stopped-flow UV-Vis electronic absorption and EPR spectroscopies, spectroelectrochemistry) of the purified artificial heme proteins bearing a heme and Trp redox cofactors, as well as comparisons of the catalytic intermediates (and their enzymatic reactivities toward the pro-drug isoniazid) with the natural KatG enzymes from *M. abscessus*, *M. tuberculosis* and *B. pseudomallei*, is expected to be performed. Lipid encapsulation of the artificial heme catalysts will serve as preceding step for further *in-cell* studies of the isoniazid reactivity of the successful artificial scaffolds, to be carried out in *M. abscessus* bacterium. The latter is a *mycobacterium* strain [3] naturally resistant to isoniazid. Experience on either natural and/or artificial heme proteins, as well as protein-based radicals as cofactors in enzyme catalysis, metalloprotein biochemistry, expression and purification of natural or artificial metalloproteins from prior research work during PhD or postdoctoral training will be important criteria for selection.

Applications (including a detailed CV, a motivation letter and two letters of recommendation, all in a single pdf file please) should be sent to Dr A. Ivancich (aivancich@imm.cnrs.fr) before March 25th, 8 pm (Paris time). Inquires can be addressed to Anabella Ivancich (aivancich@imm.cnrs.fr) and/or Stéphane Canaan (canaan@imm.cnrs.fr).

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. (a) Koebke, K.J, Kühl, T., Lojou, E., Demeler, B., Schoepp-Cothenet, B., Iranzo, O., **Pecoraro, V.L.***, **Ivancich, A.*** *Angew. Chem. Int. Ed.* **2021** *60*, 3974-3978. (b) Modenez, I.A., **Ivancich A***, **Pecoraro V.L*** Methods in Enzymology https://doi.org/10.1016/bs.mie.2025.07.013

3. (a)Reingewertz TH, Meyer T, McIntosh F, Sullivan J, Meir M, Chang Y-F, Behr MA, Barkan D. *Agents Chemother* **2019** *64*: e01899-19. DOI: 10.1128/AAC.01899-19. (b) Madani A, Ridenour JN, Martin BP, Paudel RR, Abdul Basir A, Le Moigne V, Herrmann JL, Audebert S, Camoin L, Kremer L, Spilling CD, **Canaan S**, Cavalier JF. *ACS Infect Dis.* **2019** *5*, 1597-1608.