Biophysical view of Fe centers in enzymes, focusing on heme and FeS clusters

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Resumen:

My research group is interested in fundamental and applied aspects of metallo-enzymes that carry heme and iron-sulfur (FeS) clusters. We couple biochemistry, spectroscopy, electrochemistry and theoretical approaches to i) unravel structural and functional properties of FeS cluster containing enzymes, such as those involved in DNA repair [1, 2]; here we use bacterial enzymes as models and apply the developed methodologies to analogous human enzymes, and ii) develop biotechnological applications based on FeS and heme containing enzymes [3]. The latter include DyP-type peroxidases and chlorite dismutases, for which we target sensing of their respective substrates. In this talk I will show a couple of examples from our research that focus on i) unknown roles and unusual structures of FeS clusters in enzymes [4, 5] and ii) current work on 3rd generation biosensors based on immobilized DyPs [1].

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[5] Pelmenschikov, V., Ferreira, D., Venceslau, S. S., Hildebrandt, P., Pereira, I. A. C., Todorovic, S. Substrate-Dependent Conformational Switch of the Noncubane [4Fe-4S] Cluster in Heterodisulfide Reductase HdrB, JACS 2023, 145, 7