SCIENCESPRINGDAY

FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Chemistry Department

From Proteins to Biosensors

Biological Chemistry @ REQUIMTE, FCT-UNL
Raman Spectroscopy of Metalloproteins @ ITQB-UNL

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Post-doc researcher

Degree in Biochemistry

PhD in Sustainable Chemistry

Objectives

The main goals of the research being developed are the biochemical characterization of metalloproteins involved in the sulfur and nitrogen biogeochemical cycles, the understanding of their functions and reaction mechanisms and their employment in biosensing and bioremediation. The focus is put on nitrite reducing enzymes (Fig. 1) keeping in mind nitrite implications in health and environmental pollution. In a few words:

- Protein structure-function relationships
- Enzymatic nitrite biosensors

Methodology

A multitude of techniques are used :

- Bacterial cell culture
- Two-dimensional gel electrophoresis (Fig. 2)
- Protein purification
- Protein crystallography
- Spectroscopy (UV-vis, Resonance Raman, Surface enhanced RR, etc.)
- Enzyme Kinetics
- Electrochemistry
- Electrode surface modification (sol-gel, carbon nanotubes (Fig. 3), self-assembled monolayers, etc.)

Expected Results

- Identification of proteins with potential use in bioremediation from sulfate reducing and denitrifying bacteria.
- Deepen the knowlowedge of the structure and mechanisms that govern electron transfer and catalysis of nitrite reductases.
- Achieve a better control over the behavior of nitrite reducing enzymes.
- Development and implementation of nitrite sensing biodevices (Fig. 4) with application in environment and in biomedical research.

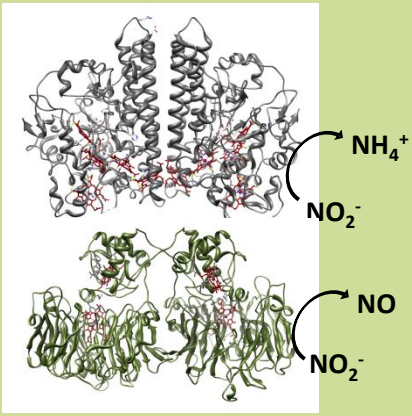

Fig.1 3D structures of nitrite reductase enzymes

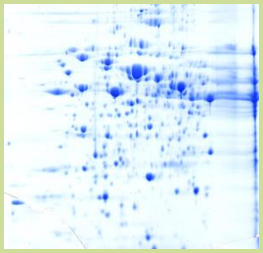

Fig. 2 Proteome of a sulfate reducer (*Desulfovibrio desulfuricans*)

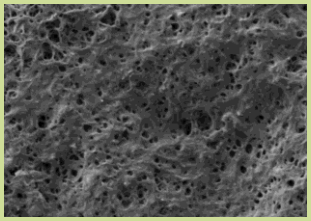

Fig. 3 Scanning electron micrograph of a nitrite biosensor - protein film covering carbon nanotubes.

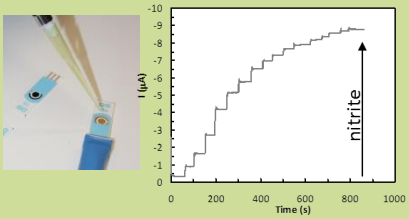

Fig. 4 Disposable electrochemical sensors and current response of a nitrite biosensor

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