

Bioelectrochemistry

REQUIMTE • Biochemistry and Biophysics

Biofísica Molecular
Molecular Biophysics



(Senior Researcher, Ciência 2008)

PhD in Biochemistry
(UNL, 2007)

10 papers in international peer
reviewed journals

2 conference proceedings

ISI Web of Knowledge index
12 (h-index=4)

Objectives

Main current research interests

- 1) Protein and enzymes catalytic activity and immobilization on novel biocompatible conducting matrices based on ionic liquids hydrogels aiming biosensor and energy production devices;
- 2) Ferritins (Ft) and DNA-binding proteins from starved cells (Dps) aiming the comprehension of the uptake/storage/release iron mechanisms and repair mechanisms elucidation; also, different DNA damage (adducts formation and statistically relevant mismatches) and repair mechanisms are under study;
- 3) Pharmacological compounds detection and development of micro-sensors for physiological and environmental matrices.

Methodology

Main methodologies and techniques

- Electrochemistry applied to biological systems, namely classic bulk and fast pulse techniques; proteins and enzymes chemical and physical adsorption on different surfaces, biological molecules immobilization in conducting polymers and ionic liquids based hydrogel materials; application of disposable screen-printed electrodes in order to achieve suitable low cost biosensors;
- Spectroelectrochemistry and piezoelectric techniques (EQCM-Electrochemical Quartz Crystal Microbalance);
- Application of Electroanalytical techniques including microelectrodes (suitable for resistive media) and hydrodynamic regimes.

Expected Results

Main achievements in the above described research topics

- Novel matrices: successful enzyme and multienzymatic systems immobilization and evaluation of the catalytic response
- Ferritin and related proteins: assessment of electrochemical response as function of metal content in presence/absence of substrates
- Pharmacological compounds detection: multiple pharmacological compounds detection on different media and comparison with standard methodologies.

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