



Research Doctorate (Ph.D.) in Chemical Sciences
32nd Cycle – Academic Year 2016/2017

Tutor:

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Project Information

1 - Title

New "bio-inspired" devices: synthetic peroxidases for chemical and biotechnological applications.

2 - Key words

Diagnostics; nanoparticles; biosensors; bioconjugation, metalloenzymes.

3 - Abstract

The immobilization of enzymes onto solid materials and their conjugation to different chemical moieties, such as antibodies or nanoparticles proved very valuable, due to several advantages with respect to the use of free enzymes. The goal of this project is to construct new bio-inspired devices, for the development of diagnostic tools, biosensor and bioelectrodes, based on synthetic heme-peroxidases.

Peroxidases are widely used for diagnostic and biosensing applications. They indeed contributed to set-up efficient protocols for immuno- and quantitation assays. Among synthetic heme-peroxidases, Fe(III)-Mimochrome VIa, a recently developed heme-enzyme, holds higher performances, in terms of reactivity and turnover number, respect to natural peroxidases, such as horseradish peroxidase (HRP). In the frame of this project, we intend to exploit the excellent catalytic activity of this enzyme and of new analogs, for their use as innovative components of diagnostic tools and/or in biosensor technology. In particular, we intend to use the synthetic heme-peroxidases as:

- i) *reporter* in immunoenzymatic assays;
- ii) components of new bi-enzymatic biosensors.

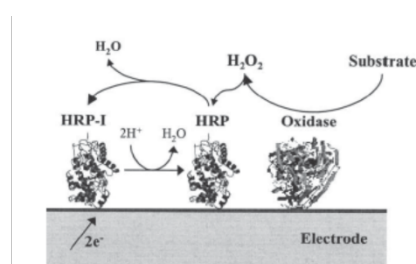


Figure 1. Schematic representation of a bi-enzymatic biosensor incorporating HRP and an oxidase enzyme.