

Master Research Projects 2016

NOVA ITQB, Oeiras

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Project 3 - Directed Evolution in Bacterial Peroxidases

Areas: Protein Engineering/Molecular Biology/Biochemistry/Microbiology/Biotechnology

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Enzymes offer an environmental benign and efficient alternative to chemical reagents in many industrial applications. However, most native enzymes are not suitable enough for practical uses since industrial processes often proceed under high temperatures and other “harsh” conditions, and specific applications often require enzymes that recognize special and non-natural substrates. Directed laboratory evolution is a powerful protein engineering tool to tailor biocatalysts with improved features or new functions. By mimicking the principles of natural selection through iterative rounds of random mutagenesis and high-throughput robotic screening, the time scale of evolution can be shortened to an experiment which can be conducted in the laboratory.

The Microbial and Enzyme Technology Lab at ITQB has been very active in improving the specificity and the kinetic or thermodynamic stability of enzymes with biotechnological potential by directed evolution (Brissos et al, Plos One 2014, 9, e87209; Brissos et al., ACS Catal. 2015, 5, 4932–4941).

This research project aims to improve the productivity and the catalytic and stability properties of bacterial peroxidases (Mendes et al. Appl Microbiol Biotechnol. 2014, 98, 2053-2065) potentially involved in the degradation of plant biomass using directed evolution approaches. This will facilitate the development of effective lignocellulose bioprocesses for industrial applications supporting the bio-refinery concept of the 21st century.