PZymes: Engineering PluriZymes for Bioproducts Recovery from Organic Waste

Description

In this project, we present PluriZymes, enzymes containing multiple (engineered) catalytic actives sites in a single scaffold, as one of the next breakthroughs in enzymatic catalysis. We show clear preliminary evidence of the potential role of PluriZymes in optimizing complex biochemical processes, such as cellulose degradation, or to group cascade reactions into one single enzyme.

We will develop a general and intuitive tool to model the design of PluriZymes, to be used directly by all researchers, maximizing its impact. Moreover, as a proof of concept, we will provide more efficient production of bioplastics (PHA) from waste, introducing also simultaneously a more efficient pathway for its degradation. Overall, our approach has a large potential to influence future biotechnological developments at a scientific and technical level, with a clear return, importantly, to society; enzymatic processes results in a reduced contribution to global warming, acidification, eutrophication, photochemical ozone formation and energy use.

The research will be conducted in one of the Singular Scientific and Technical Infrastructure (ICTS) in Spain, the Barcelona Supercomputing Center (BSC), and by a group with proven expertise in enzyme engineering and in state of the art methodology developments. Our research lab, in addition, has shown to place emphasis on internationalization and transfer of technology. In this line the outcome of the research might be transferred to BSCs first spin-off, Nostrum Biodiscovery, improving the competitiveness of the Spanish biotechnological industry.

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