BIOCATALYSIS

This line of research focuses on the use of biocatalyzed processes for the production of optically active chiral molecules and biologically active compounds derived from natural products. Typically, biocatalysts are enzymes of bacterial origin which are extracted and purified or more often cloned and expressed in suitable recombinant bacteria. Enzymes are ideal catalysts for the development of processes with a low environmental impact, due to their proteinous nature, their ability to promote transformations in aqueous media (but not only) at temperature < 100 °C and, above all, their selectivity (which limits byproducts formation). The sustainability of biocatalyzed transformations may be further expanded through catalyst immobilization onto natural (synthetic) polymer matrices by covalent bonding. An immobilized enzyme has some distinguishing advantages, such as greater stability and ease of separation from the reaction mixture, which allow its reuse in several reaction cycles (with clearly economic benefits).

GOALS

- Development of synthetic methodologies based on the use of carboligases (C-C bond-forming reactions), dehydrogenases (reduction of prochiral ketones) and lipases (transesterification reactions).
- Study of reactions involving the combined use of diverse enzymes or enzymes and organocatalysts.
- Study of biocatalyzed processes in both batch and continuous flow modes in the presence of immobilized enzymes.

INSTRUMENTS AND METHODS

Mass (MS) spectrometry and infrared (FT-IR) spectroscopy. Nuclear magnetic resonance (NMR). Elemental analysis. Chromatographic instruments.

MAIN SUBJECTS

Organic chemistry, biochemistry

RESEARCH GROUP

Olga Bortolini
Alessandro Massi
Marco Fogagnolo
Giancarlo Fantin
Pier Paolo Giovannini
Daniele Ragno
Carmela De Risi

COLLABORATIONS

Prof. M. Muller (University of Fribourg, Germany), Prof. D. de Oliveira (Universidade Federal de Santa Catarina, Brasil), Dott. G. Bernacchia, Dott. N. Marchetti (University of Ferrara)