“BIO”CATALYSIS FOR ENERGY: ENZYMES, ARTIFICIAL ENZYMES AND BIOINSPIRED CATALYTS

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New technologies for storing solar or electrical energy are crucial for the energetic transition. An attractive scenario consists in the conversion of renewable energies into chemical energy, via water splitting into hydrogen and oxygen. Hydrogenases are the most active molecular catalysts for hydrogen production and uptake on earth and are thus extensively studied with respect to their technological exploitation in order to replace noble metals (such as platinum) within (photo) electrolysers and fuel cells. Because these enzymes suffer from a number of drawbacks, in parallel, bioinspired catalysts and artificial hydrogenases are being extensively developed. Here we present our efforts in: (i) engineering hydrogenases and their maturases; (ii) developing bioinspired molecular cobalt-, iron-, molybdenum and nickel-based molecular catalysts; (iii) developing bioinspired heterogeneous electrode materials for water splitting; (iii) developing artificial systems based on the combination of molecular complexes with well-designed protein scaffolds.

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