

ARTIFICIAL PHOTOSYNTHESIS

Artificial photosynthesis targets the conversion of solar energy into chemical fuels by means of photoinduced transformations of suitable, abundant substrates. Among several reaction schemes, water splitting into hydrogen and oxygen represents the most challenging transformation. Taking inspiration from the working principles of natural photosynthetic systems, the research aims at the development of functional units for the light-harvesting (antennae), for the photoinduced charge separation (reaction centres), and for the storage and utilization of accumulated charges (multi-electron catalysts). As far as the synthetic aspects is concerned, the project takes advantage from collaborations with different laboratories in Italy and abroad. Of particular relevance within the research group is the optimization of the kinetic aspects, crucial for the resulting efficiency of the investigated molecular systems. Within this framework, several time-resolved spectroscopic techniques are employed in both the fast (nanosecond) and ultrafast (pico/femtosecond) regime.

GOALS

The research activity can be divided into two main lines:

- artificial reaction centers for photoinduced charge separation
- multi-electron catalysts for oxidation and reduction

INSTRUMENTS AND METHODS

Nanosecond laser flash photolysis, pump-probe femtosecond transient absorption spectroscopy, electrochemical and photoelectrochemical techniques, gas-chromatographic techniques.

MAIN SUBJECTS

Photochemistry, Photocatalysis, Electrochemistry, Inorganic chemistry

RESEARCH GROUP

Mirco Natali

COLLABORATIONS

- Prof. E. Iengo (Università di Trieste)
- Prof. M. Bonchio, Prof. A. Sartorel, Prof. C. Zonta (Università di Padova)
- Prof. S. Campagna (Università di Messina)
- Prof. X. Sala (Universitat Autònoma de Barcelona, Spagna)
- Prof. A. Cabrera (Pontificia Universidad Católica de Chile, Cile)
- Prof. I. Gonzales (Universidad Central, Santiago, Cile)
- Prof. Paulina Dreyse (Universidad Técnica Federico Santa María, Valparaíso, Cile)