

Research project and activity plan

ORGANIC DYES AND METAL COMPLEXES FOR WATER PHOTOSPLITTING

The research project aims at the fabrication of a standalone photoelectrochemical (PEC) device for the overall water splitting, in which tunable molecular units, embedded in an aerophobic hydrogel, cooperatively work to absorb sunlight and exploit the photogenerated redox equivalents to perform interfacial reactions.

This research is funded by the research project entitled: "PHOTOactive aerophobic hydroGels for hydrogEN generation in molecular-based photoelectrosynthetic cells" (PHOTOGEN).

The research project will be focused on the synthesis and characterization of photo- and electroactive inorganic and organic chromophores, able to drive electron/energy transfer processes upon light excitation, for application in photoelectrochemical cells.

The research activity is aimed at: i) the synthesis of photo- and electroactive species (dyes and metal complexes); ii) their photophysical and electrochemical characterization; iii) the analysis of the exploitable photo-induced processes; and iv) the performance of the obtained materials in photocatalytic and electrocatalytic reactions.

The experimental skills required are: knowledge of standard synthetic procedures for organic and inorganic materials (chemical characterization: GC, HPLC, NMR, HRMS, etc.); photophysical characterisation (absorption and emission spectroscopy in the UV-vis-NIR spectral range, both with steady-state and time-resolved techniques), irradiation and actinometry; cyclic voltammetry and spectroelectrochemistry.

The project's interdisciplinary nature requires the continuous research by the candidate into emerging developments, as well as a team-oriented mindset, strong English communication skills, and a remarkable degree of creativity and research commitment.