

Research project and activity plan

Design and synthesis of organic dyes for photocatalytic water remediation

The research project will be focused on the synthesis and characterization of the photophysical and electrochemical properties of organic chromophores, able to drive electron/energy transfer processes upon light excitation, for their application in hybrid organic materials for water remediation.

This research is funded by the research project entitled "ENGINEERING LIGHT-activated materials for the abatement of ENVIRONMENTALLY hazardous and POLLUTING substances" (ENLIGHTENING). The goal of this project is to design and develop new classes of organic materials for the photodegradation of hazardous chemicals in aqueous environments. The functionalization of a polymeric support with appropriate chromophores will allow oxidation or reduction processes for the degradation of polluting substrates by exploiting their photoreactivity.

The research activity is aimed at: i) the synthesis of photo- and electroactive species based on organic dyes; ii) their photophysical and electrochemical characterization; iii) the analysis of the exploitable photo-induced processes; and iv) the performance of the obtained materials in photoinduced reactions with water pollutants.

The experimental skills required are: knowledge of standard synthetic procedures for organic and inorganic materials; chemical characterization techniques such as GC, HPLC, NMR (1D and 2D), HRMS, DSC, TGA, FTIR; photophysical characterisation in solution and solid phase (absorption and emission spectroscopy in the UV-vis-NIR spectral range, both with steady-state and time-resolved techniques); cyclic voltammetry and spectroelectrochemistry; skills in structural characterization through XRD techniques are a plus.

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.