

INORGANIC PHOTSENSITIVE MATERIALS FOR HETEROGENEOUS CATALYSIS

Semiconducting oxides (such as TiO_2 and WO_3) and polyoxoanions, which are considered as their molecular models, are important materials with potential applications in photocatalysis for degradation of pollutants and emerging contaminants (e.g., drugs).

GOALS

The research activity is focused on the synthesis and characterization of solid inorganic catalysts mainly based on semiconducting oxides. One of the main goals is the understanding of the effects of several parameters, such as the nature of the crystalline phase, on the photocatalytic activity. Particular attention is also deserved towards the study of the surface energetics. Of particular interest is the study of the mechanism of the photocatalytic reaction by monitoring transient radical species involved in the process.

These photocatalysts under irradiation are equivalent to electrodes under open-circuit conditions. This clearly determines the possibility to move from photocatalysis to photoelectrocatalysis. Targets reactions are both reduction and oxidation processes. Particular attention is devoted to the use of the photocatalytic and photoelectrocatalytic technique as an advanced oxidation method for the degradation of pollutants and emerging contaminants, which can be potentially coupled to sustainable reactions including hydrogen production or carbon dioxide reduction.

INSTRUMENTS AND METHODS

Light sources for photolysis experiments, UV-Vis, DR UV-Vis, IR, GC and HPLC, EPR-spin trapping, electrochemical techniques.

MAIN SUBJECTS

Inorganic chemistry, Electrochemistry, Photoelectrochemistry, Photocatalysis, Material science.

RESEARCH GROUP

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