UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Introduction to photochemistry

2223-94R-SCGA11

Title

Introduction to photochemistry

Teacher(s)

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Language

English

Short description

The basic principles of Photophysics and photochemistry applied to photocatalisys

- Unimolecular and bimolecular excited state decay processes
- Dyad photosensitizer-catalist in pohotocatalysis
- Photoinduced Electron transfer: Markus theory and quantum approach
- Energy transfer: Förster and Dexter mechanism
- *All-in-one* example: $[Ru(bpy)_3]^{2+}$ in electron-trasfer and energy transfer photocatalysis

- How to investigate photocatalytic processes: experimental tecniques (absorption and emission spectroscopies, photochemical kinetic measurement within Stern-Volmer equation) and computational approches (Time-dependent DFT)

Photophysics:

- light-matter interaction and photostimulation processes

- Interactions between atoms and molecules and photographic processes

- Frank-Condon's Principle

- Dynamics and time scale for decaying an excited state (fluorescence, phosphorescence)

Photochemistry:

- Organic photochemistry and photochemical processes

- Organic photochemistry: Photostimulate organic reactions

- Radical or ionic dissociation

- Intrameloogic rearrangements and photoisomers

- Hydrogen atom abstraction

- Photodimerization, photoaddition, photoionisation reactions

- Photochemical activity of aromatic compounds

- photochemistry of diazo- and azide compounds

- Photo-removable protective groups

- Chemiluminescence

Technical and experimental aspects of organic photochemistry

- Inorganic photochemistry and coordination compounds

- Characterization of the inorganic and coordinated electron spectra

- Decay and Lifetime kinetics of an excited state

- Energy transfer: Förster and Dexter mechanism

- Electron transfer: Markus theory and quantum approach

- Proton-coupled electron transfer

- Redox properties of excited states of coordination compounds: the case of [Ru(bpy)3]2+;

Objective of the program: The mini-course of photochemistry is an introduction to a selection of general, organic, inorganic, biological, solid state and theoretical photochemical themes with the aim of providing to phd students knowledge in basic principles and application of photochemistry.

Evaluation: NO

CFU / Hours

2 CFU - 16 Hours (Lecture)

Teaching period

II semester