POM-BASICS Summer School

"Polyoxometalate Chemistry for Fundamentals and Applications"

La Rochelle-France, June 13-15th 2022

Session 2. Fundamentals-Mastering the redox properties of POMs for electron transfer and storage

Polyoxometalate-based electron transfer modulation for efficient electrocatalytic applications

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Abstract of the course:

The course on Polyoxometalate-promoted electrocatalytic reactions has as purpose to introduce you into the world of green electrochemistry starting from its basics and ultimately leading to the hottest applications that can currently be found in academy and industry such as the reduction of NO_x or the recycling of CO_2 through the electrochemical reduction into valuable chemicals or the (photo)-electrocatalysis of water (H_2O) splitting. This course aims to overview the variety of efficient applications of free POM and POM-based (nano)composites as electrode modifiers, focusing predominantly on those applied to electrocatalysis. Firstly, the general methodologies used in the preparation of free POMs and POM-based (nano)composites and the different strategies used to surface electrodes modification will be briefly described. Then, the role of POM-modified electrodes in reductive and oxidative electrocatalysis for detection/sensing of several (bio)molecules of interest will be reviewed. Finally, the application of POM-based (nano)composites as electrocatalysts for the reduction/oxidation reactions relevant to renewable energy storage and conversion technologies is described. Electrochemical methods such as the cyclic voltammetry, the chronoamperometry, Tafels plots, TOF determination will be shortly described. *In situ* physical techniques coupled to electrochemistry (FTIR, Raman, Differential Electrochemical Mass Spectroscopy (DEMS), etc.) will be also described.