

# **Shaping the light energy flow with plasmonic nanostructures for the production of solar fuels**

Alberto Naldoni

*Czech Advanced Technology and Research Institute, Regional Centre of Advanced Technologies and Materials, Palacký University Olomouc, 78371 Olomouc, Czech Republic.*

corresponding author: [alberto.naldoni@upol.cz](mailto:alberto.naldoni@upol.cz)

The sustainability of the future energy system relies on discovering new and more efficient paradigms that enable the storage of solar energy in the form of chemical bonds through the production of solar fuels. Metallic nanostructures provide enhanced light-matter interaction and concentrate light in nanoscale volumes due to the excitation of surface plasmons, collective oscillation of surface electrons tightly bound with the electromagnetic field of light. Plasmonic nanostructures have recently shown the capability to enhance solar energy conversion into chemicals due to several plasmonic effects such as electromagnetic hot spots, non-thermal carriers, and local heating. In this talk, I will present our recent results exemplifying the use of plasmonic materials to boost chemical reactions relevant for energy applications, while illustrating various fabrication strategies to obtain both colloidal plasmonic nanocrystals and plasmonic metasurfaces with improved optical and catalytic properties. The fundamental mechanisms determining the photocatalytic activity will be discussed before providing outlooks on the future development of plasmonic devices for energy.