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New advances in MOFs photonics and applications

Metal-Organic Frameworks (MOFs), a class of crystalline porous compounds, have emerged as smart materials with a wide range of uses and applications. In this Lecture, I will talk about our results exploring the spectroscopic and photodynamical properties of a series of Zr-based MOFs and their possible uses in nanophotonics, photocatalysis and detection of explosive molecules. We investigated the photoproperties of Zr-NDC MOF, which is made of Zr-clusters and 2, 6-naphthalene dicarboxylate linkers. We have incorporated different dyes into the MOF porous structure and showed the occurrence of energy transfer processes from excited MOF to the trapped dyes. We have also studied the photoproperties of Zr-NDC and a mixed-linker Zr-MOF (Zr-NADC) by using transient absorption techniques. We have established the formation of a charge separated state in both MOFs. Upon excitation, an ultrafast ligand-to-cluster charge transfer process takes place, leading to the formation of the related long-lived charge separated state. I will also show results on efficient light harvesting within C153 at Zr-Based MOF embedded in a polymeric film and the use of two new functionalized mixed-linkers MOFs (Zr-NDC/To1 and Zr-NDC/To2) as fluorescent sensors of nitroaromatic explosive molecules. These results shed new light on the photoproperties of different luminescent MOFs and their possible photonics applications, opening the way for further investigations and giving clues to new developments of smarter MOF materials.

Biography

Abderrazzak Douhal is a Professor at the University of Castilla-La Mancha, Spain. His research is focused to the study of photoevents in condensed phase, molecular pockets and pores, advanced hybrid materials based on zeolites, mesoporous materials and metal-organic frameworks and perovskites-based solar cells using different techniques of ultrafast spectroscopy and single molecule fluorescence microscopy. He has published more than 160 scientific contributions and served as a Member of the Editorial-Boards of *Chem. Phys. Lett, J. Photochem, Photobiol. A. Chem.*, and *Inter. J. Photo-energy*. He is a Member of RSEQ, GRUFO, EPA, IUPAC, IAAM and AAAS.

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