

Present project is focused on the interactions of selected metal-organic frameworks (MOFs) with wide bandgap semiconductors. Development of the efficient and stable systems utilizing accessible and renewable energy sources is still one of the biggest scientific challenges of present days. In this aspect, there is an incessant demand for new visible light-active materials capable of conversion of solar energy to chemical or electrical energy. Unfortunately, utilization of inorganic wide bandgap semiconductors, which show often the best electronic structure, suitable redox properties and incomparable stability, for visible light induced processes require some modifications. Metal-organic frameworks (MOFs) seem to be the best choice for this purpose. They are a relatively new group of crystalline solid materials and already constitute one of the fastest growing fields in materials science. Recently, hybrid materials composed of MOFs and semiconductors gained much attention due to high photocatalytic and photoelectrochemical activity, significant stability, and, what is most important, enormous chemical and structural diversity of MOFs components. Facile modulation of MOF properties by changing the type of organic ligands and metal ion or clusters opens infinite possibilities for tuning up the properties of such hybrid materials. The photochemical and physical properties of such composites should also strongly depend on the type of organic linkers combining MOFs with semiconductors' surface, which might differ from organic linkers forming MOF's structure.

Although such a hybrid materials are increasingly developed in many fields, still little is known about interactions between MOFs and inorganic semiconductor, especially from the point of view of optical, photochemical, photoelectrochemical and photocatalytical properties of these complex systems. Moreover, there is a lack of studies on interaction of organic linkers with the surface of semiconductors and its influence on the electronic structure of the materials. Thus, it is important to initiate such a research. Recognition of the dependency between chemical structure of the MOF, type of the linker, properties of the semiconductor and photoactivity and photoselectivity of the hybrid material is essential for development of new materials with desired properties which will be able to compete with, or even outmatch, well-known dye sensitized semiconductors or doped materials currently widely used in photovoltaic, photocatalytic and optoelectronic devices.