Porous materials (i.e., solids containing open channels or chambers) are currently the subject of intensive scientific research. These materials are very diverse in regard to their chemical composition, methods of their synthesis as well as their present and perspective applications. Most important applications include adsorption processes utilized for purification and separation of different substances. .

Porous coordination polymers represent a new generation of porous materials. They comprise metal cations interconnected into a three-dimensional network via organic or inorganic linkers. Inside their crystal lattices there are free open spaces. Due to their presence, metal-organic frameworks can act as molecular sieves, as they have the ability to adsorb small molecules of size and shape fitting geometry of the pores. Owing to their capacity for adsorption of H_2O molecules, some porous coordination polymers may be used as adsorbents in systems for harvesting of water from air in desert regions. Taking into account their expected operation conditions, such adsorbents should exhibit large adsorption capacity for water and good resistance against water vapor at elevated temperature.

Experimental measurements of water adsorption and hydrothermal stability are not easy, as they are time-consuming and require advanced, rarely available equipment. These difficulties justify the need for development of new experimental methods for studying adsorption of water and resistance of the adsorbents against water vapor at elevated temperature. One of such method is quasi-equilibrated thermodesorption developed by the project leader. This project involves the advancement of this method by it adaptation to measurements of water adsorption and hydrothermal stability of adsorbents. Afterwords, it will be applied in studies of two groups of porous coordination polymers: adsorbents dedicated to harvesting of water from air as well as materials changing their magnetic properties due to dehydration or rehydration, that potentially may be applied in construction of switches and memory elements in electronic systems.