

**Monolithic, hierarchically porous MOF-carbon composites for environmental applications**

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The aim of the contribution is to introduce a supported joint Czech-Slovak research project. The essence of the project is to prepare and characterize new composite materials composed of Hierarchically Porous Carbon Monoliths (HPCM) and Metal-Organic Frameworks (MOF) for environmental applications. This type of composite material (MOF@HPCM) combines the advantages and properties of porous carbon and MOF. At the same time, special emphasis is placed on their various methods of synthesis, adsorption measurements, and structural analyses. Within the project, applications are defined into three sub-objectives:

1. The use of composites as carbon dioxide adsorbents to reduce emissions of this greenhouse gas in the atmosphere.
2. Development of composite materials, containing metal nanoparticles to increase the storage capacity of hydrogen, as fuel tanks.
3. Capture of heavy metal ions and organic pollutants in wastewater.

Described applications are directly related to meeting the European Union's targets under the Green Deal, which commits all Member States to reduce carbon dioxide emissions by 55% by 2030 and carbon neutrality by 2050. The project contributes to this goal by developing new MOF@HPCM materials able to directly capture CO<sub>2</sub> and store hydrogen (fuel tanks) for transport vehicles, which are the main producers of CO<sub>2</sub>. In addition, the project contributes to improving the quality of the hydrosphere that contains inorganic and organic pollutants due to increased anthropogenic activity and industrial production.

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