Porous coordination polymers (PCPs) or metal–organic frameworks (MOFs), which are constructed from metal ions and organic ligands, have been extensively investigated to provide the nanometer-sized space that is potentially applicable in separation, heterogeneous catalysis, and gas separation/storage. Recently, we reported porous crystalline materials that can be activated by photostimulation [1] and demonstrated that photochemical modification is a powerful method for the control of physical properties of PCPs or MOFs.

In this report, synthesis and properties of new PCPs containing trans-1,2-bis(4-pyridyl)ethene (bpe) as a photoactive module will be presented. The photoactive PCPs adsorb gaseous molecules such as carbon dioxide. The bpe molecules quantitatively take place topochemical [2+2] cycloadition reactions and the PCPs show single-crystal to single-crystal (SCSC) transformations upon UV irradiation (> 300 nm). We will discuss not only the SCSC transformations but also the impact on the photochemical transformations on the sorption properties.

References:


Keywords: microporous, photoreaction, adsorption

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Pressure-induced magnetic switching in molecular framework materials

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The design and characterization of molecular materials with targeted functionalities, such as magnetism and/or nanoporosity, is part of a major international push aimed at developing systems with technologically important applications (e.g., molecular sensing and storage). As such, the accurate elucidation of their often complex structure-function relationships presents a crucial step in their advancement. For molecular magnetism, these approaches are commonly focused on variations of temperature and/or magnetic field, while comparatively little attention has been given to how these materials behave as a function of pressure. Here, we report magneto-structural investigations of magnetic molecular materials using synchrotron-based structural studies (powder diffraction and pair distribution function) and magnetic susceptibility measurements at high pressures. These studies have revealed a range of interesting phenomena such as orbital reorientations, spin crossover, phase transitions, and extreme compressibility [1].


Keywords: high pressure, magnetism, phase transition

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The crystal structure of Ziegler-Natta catalyst supports

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