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# Instrumentations for in situ PXRD and XAS during the adsorption of gases and vapours at KMC-2 beamline of BESSY II synchrotron

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Metal-Organic Frameworks –a class or crystalline porous materials with high surface area and pore volume and application potential ranging from gas storage and catalysis to electronic devices. One of the unique features of MOFs is adsorption induced structural switching. In order to follow the phase transitions and pore filling mechanism during the gas and vapour adsorption, three different types of instrumentations were established at KMC-2 beamline of BESSY II synchrotron. First one is dedicated to monitoring of the structural changes in flexible MOFs during low-pressure (up to 1 bar) adsorption of non-corrosive gases at temperatures close to the boiling point of the fluid. The second type of the instrumentation provides a possibility to measure PXRD patterns in parallel to a high pressure adsorption (up to 80 bar). The main concept of the third type of the cell is to provide deeper insights into the mechanism of the pore filling during the adsorption of vapours, which is one of the critical points for selection of materials for application in adsorptive heat pumps. Low- and high-pressure gas cells are commissioned at KMC-2 beamline of BESSY II and are available for users of the large scale facility. The vapour cell is now under commissioning and will be available by middle 2019.

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