

Theoretical model for mass transport and adsorption of gases in porous solids based on the frequency response method

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Detailed knowledge of mass transport and adsorption is one of the key factors in the development of novel high-performance porous materials for a wide range of technical applications. In the course of an optimization process, a quick conclusion on the properties of the pore system and its accessibility for certain sample molecules is crucial. On the other hand, predictions about the pore system can save steps in material development.

The frequency response method is a promising analysis technique for the determination of such transport processes taking place inside the pore structure. By simply recording the macroscopic quantities pressure and temperature, this method can be a meaningful tool for characterizing transport processes of gases in porous materials by combining practical measurements with mathematical modelling. The modelling of the measurement result should provide kinetic parameters such as diffusion and adsorption coefficients.

In addition, the method offers the possibility to simulate the complex mass transport and adsorption processes. For this purpose, a standard model has to be developed, since there are no standard models in a suitable simulation environment so far.

For these research purposes an apparatus is available, which is shown in Figure 1.

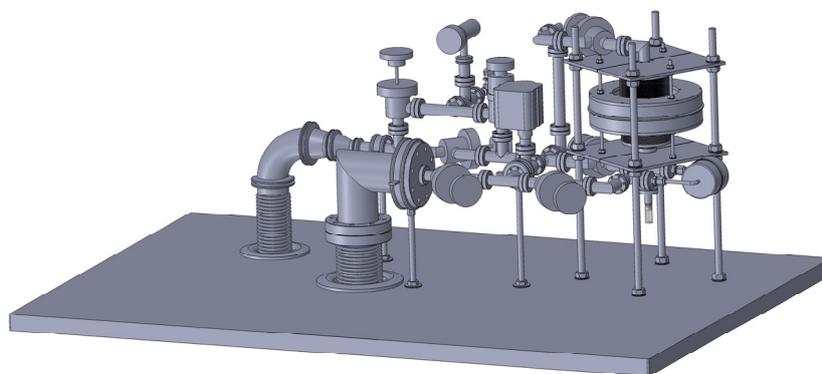


Figure 1: CAD model of frequency response installation.

Establishing this measurement method for the characterization of porous materials is the goal of current research work.