

Selective pore size modification in inorganic membranes

Dissertation of Hendrik Reimann

University of Paderborn – Faculty of Science – Department of Chemistry

Important tools of gas separation and water preparation are carbon membranes. Therefore a selective modification of membran parameters is necessary. In this thesis a method for selective and controlled reduction of pore size in inorganic membranes is introduced and valuated by appropriate analytical measurements.

For modification and characterisation commercial available asymmetric ultrafiltration membranes of carbon or alumina are used. Also self-made nanoporous carbon membranes are used for modification. The pore size is reduced and modified by chemical vapour infiltration (CVI) of pyrocarbon. The substrates and resulting porous materials were characterized by Thermoporometry, Permporometry and scanning electron microscopy (SEM).

The accurate determination of the structural parameters like pore size and pore size distribution could be won by the engaged measurement processes. Therefore they are bases for adaptation and optimisation of the reaction parameter of the CVI-Process. Furthermore it could be shown, that a selective and policed reproducible pore size reduction is possible with carbon deposition. As example starting from a membrane with middle pore size of 30 nm could be marked down to every aimed pore diameter.