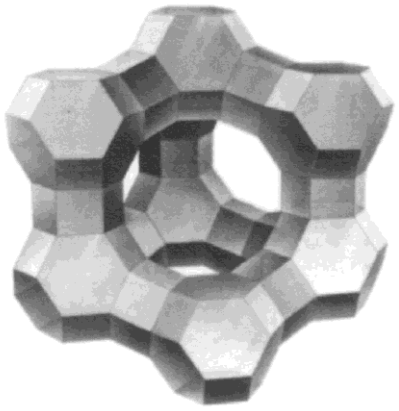
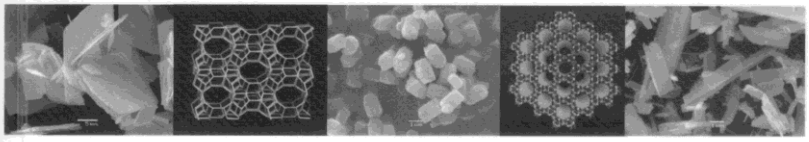
School of Molecular Sieves

Prague, April 1-3, 2012





Program and Book of Abstracts

P15

MACROPOROUS ALUMINA COATED BY LAYERS OF POROUS OXIDES

Jozef Magura, Vladimír Zeleňák

Department of Inorganic Chemistry, Faculty of Science, UPJŠ, Moyzesova 11, 041 54, Košice, Slovak Republic

Membrane separation processes are generally more energy efficient and easier to operate than other separation processes. In particular, inorganic membranes such as zeolites and porous oxides would be suitable materials for the separation of gases at high temperature and high pressure, because they are more resistant to severe conditions than organic membranes[1]. Aim of our study is to design and synthesis of mesoporous silica and alumina membranes with long-term regenerative stability and high selectivity towards mixture of different gases (CO_2, H_2, N_2). In our work were silica and alumina thin layers deposited on macroporous alumina supports. We have chosen to study the Al_2O_3-SiO_2 and Al_2O_3- Al_2O_3 system for its interesting properties and the interest which may bring in the domain of inorganic membranes with high chemical and mechanical resistance. Colloidal sols were obtained by sol-gel synthesis. The syntheses of gels were based on hydrolysis-condensation reactions to form an inorganic oxide from molecular precursors. Prepared sols were applied to fabricate porous silica and alumina membranes coated on supports by the dip-coating technique. In the process of coating layers, substrates were dipped into a liquid coating solution and then were withdrawn from the solution at a controlled speed 10 mm/min. In order to remove the organic template from the pores of silica and alumina layers were samples calcinated at 500 °C for 7 hours in the last step of preparation of these materials. The deposited films of porous oxides were characterized by nitrogen adsorption/desorption at 77 K (Fig. 1). The permeance of different gasses (CO_2, H_2, N_2) through prepared membranes is at the beginning of our study.

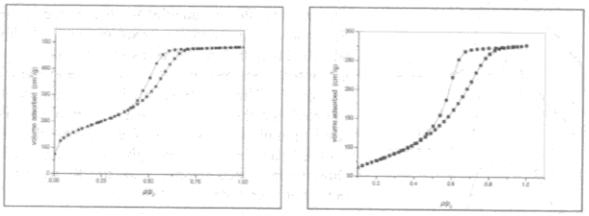


Fig. 1 Adsorption and desorption isotherms of prepared sample - thin films of silica (left) and alumina (right)

Acknowledgements:

This work was supported by the Slovak Research and Development Agency under contract APVV-LPP-0093-09, VEGA project (No. 1/0583/11) project of Ministry of Education of Slovak Republic and DESY project I-20110282 EC.

References:

[1]Kumar, P.; Guliants, V. V. Microporous Mesoporous Mater. **2010**, 132, 1–14.