

SILICA POROUS MEMBRANES SYNTHESIS AND CHARACTERIZATION

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Abstract

Porous materials have attracted the attention of chemists and materials scientists due to commercial interest in their application in chemical separations and heterogeneous catalysis as well as scientific interest in the challenges posed by their synthesis, processing and characterization. The sol-gel process provides the technique for producing thin ceramic porous layers with controllable porosity. The sol-gel process is based on the hydrolysis and condensation of molecular precursors. The oxides net-work is formed in the solution through inorganic polymerization reactions. Sol-gel chemistry is performed at room temperature and presents many advantages for the powderless processing of ceramics. The porous silica membrane was synthesized by hydrolysis and condensation of tetraethoxy silane [Si(OC₂H₅)₄] in water/ethanol solution and hydrochloric acid used as reaction catalyst. The influence of some important parameters including water/alkoxide molar ratio, temperature, time, solvent in the synthesis gel was examined.

Thin membrane layers were deposited on α -alumina support.

The structural characterization was studied by differential thermal analysis, infrared spectroscopy, and X-ray diffraction. The thickness and morphology of the layers were controlled by scanning electron microscopy.

The textural characterization by nitrogen adsorption-desorption allowed us to observe the variation of surface area, porous volume and pore diameters according to temperature.

The sol-gel process has been successfully used for the realization of thin porous silica layers with good characteristics.

Keywords: sol-gel , porous , inorganic ,membrane