Investigation of pore structure and transport properties of carbon membrane modules from various kinds of polymeric precursors

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Recently, Membrane separation process is attracted as one of the key technology to develop CO_2 separation and sequestration or O_2 and H_2 purification system for fuel cell application. High gas flux and high selectivity are required for these applications to adapt membrane process. Porous carbon molecular sieve membranes (CMSM) were utilized for applications such as water and air purification, gas separation, and energy storage. In the field of gas separation, the key-factors determining the microstructure and gas separation properties of the carbon membranes are the choice of the polymeric precursor and the pyrolysis conditions. The polymeric precursors have been chosen as materials that generate carbon above 25-50% of the original mass of the precursor after the pyrolysis. Here we prepared various kinds of CMSM modules using conventional polymer precursor such as polyimide, phenolic resin, polyacrylonitrile, cellulose acetate, and polyetherimide. The pore structure such as pore volume and surface area of CMSM was characterized using BET adsorption experiment. The CMSM modules were tested for gas mixtures such as O_2/N_2, CO_2/CH_4 and also gas separation performance at high temperature was estimated.