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Fabrication of hydrophilic and hydrophobic silica aerogel by drying at ambient pressure and their structural properties

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Abstract

In this research, silica aerogel was made by sol-gel method with sodium silicate precursor and drying at ambient temperature. The silica aerogel prepared by this method is superhydrophobic. To make it hydrophilic, the sample was heated at 400 °C for 2 h. The structure of the samples was studied using X-ray diffraction, scanning electron microscopy, adsorption and desorption of nitrogen gas. To investigate the hydrophilicity and hydrophobicity of the samples, the water droplet contact surface test was performed. The chemical bonds of the prepared samples were studied using Fourier transform infrared spectroscopy. The overall results showed that the size of the particles and the pores increase and become smaller, respectively when the hydrophilicity of the silica aerogel sample changes to the hydrophobic sample. The angle of contact of the water droplet with the surface of the hydrophobic sample is 170°, while reaches to 51° for the hydrophilic sample.

Keywords: silica aerogel; superhydrophobic; ambient pressure; sol-gel; nanostructure

For full article, refer to the Persian section