Synthesis of low-density monolithic silica aerogels using water glass at ambient pressure

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A crack-free silica aerogel monolith were synthesized from a cheap waterglass derived silisic acid solution by adding glycerol, which serves as a drying control chemical additive. The surfaces of the wet gel with glycerol were modified using HMDS/n-hexane followed by exchange ofsolvent from water to n-hexane and dried at ambient pressure (APD). The addition of glycerol appearsto lend the wet gel a more homogeneous microstructure and enhanced mechanically stiffness. It enhances a distinct "spring back effect" at the critical stage of the formation of highly porous silica network, without structural collapse. The aerogels with glycerol maintains a relatively low bulk density. The aerogels were mesoporous solids with the average pore diameter ranging from 10.2 to 12.6 nm. The results have been discussed by taking into consideration the effect different % of glycerol additive onthe monolithicity of the silica aerogels. Synthesized nanoporous silica aerogel characterized by using FT-IR spectroscopy, TG analysis, N2 absorption /desorption (BET), contact angle and Field Emission scanning electron microscope (FE-SEM).