

Sol-gel synthesis and preliminary characterizations of novel silica hybrid xerogels

Abstract

Hybrid silica xerogel mesoporous composite was synthesized by a mild temperature acid catalysed sol-gel route where a natural copolymer; sodium alginate (Na-COOH) together with calcium oxide (CaO) powder were incorporated into silica sol precursor prior to gel formation. For this study, bulk xerogels samples were prepared with the amount of silica precursor and the natural copolymer was fixed meanwhile the loading of calcium oxide was varied at 10 and 20 wt%. The monolith silica was also synthesized as control parameter. The preliminary properties were investigated using XRD, FTIR and SEM together with EDS for elemental analysis. The calcium oxide powder used in this study was prepared from calcium hydroxide, CaOH compound, which was previously calcined at 1000°C for 3 hours in normal air. The component of calcium oxide and sodium alginate were found to be uniformly dispersed in matrixes without affecting the cross-linked silica formation. As the presence of the components in the silica matrixes, the synthesized hybrid xerogels were found to be crack-free, structurally amorphous and physically opaque. Furthermore, the hybrid xerogels samples were found to have denser bodies, smoother surface, and decreased in particle sizes and thus might produced less brittleness in nature compared to the monolith xerogels.

Keywords; Composite, Hybrid Material, Mesoporous, Silica Xerogels, Sol-Gel Synthesis