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# LIGHT-WEIGHT SIO2-AL2O3 AEROGELS FOR HIGH-TEMPERATURE THERMAL INSULATION

**Abstract**

Light-weight SiO2-Al2O3 aerogels have been synthesized by a sol-gel method with partly hydrolyzed TEOS as silica source and $\gamma$-Al2O3 nanoparticle as alumina precursor. Several techniques such as SEM, TEM, XRD, DTA and N2 adsorption-desorption were adopted to characterize the morphology and structure of the SiO2-Al2O3 aerogel. It is found that the SiO2-Al2O3 aerogel with $\gamma$-Al2O3 imbedded in the silica network uniformly possess highly porous structure. The surface area of the SiO2-Al2O3 aerogel with 10wt% $\gamma$-Al2O3 is 700m2/g and the pore size is 13nm. The thermal stability results showed that the incorporated $\gamma$-Al2O3 nanoparticles can prevent sintering if the silica, which significantly enhance the temperature limit of silica aerogel exceed 1000. The surface area of the above SiO2-Al2O3 aerogel sample is 505m2/g after calcination at 1000 for 30 minutes under atmosphere, while the pore size is identical to the original sample. SEM images confirmed that sintering of the SiO2-Al2O3 occurred above 1200. The superior thermal stability of the synthesized SiO2-Al2O3 aerogel with low thermal conductivity is a promising candidate for thermal insulator used at temperatures greater than 1000 demanded for hypersonic vehicles.