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WATERPROOFED SILICA AEROGEL FOR WAVE-TRANSPARENT AND THERMAL-INSULATION

Abstract

Wave-transparent materials are highly demanded for hypersonic vehicles. To prevent the severe aerodynamic heating transferring, high thermal insulation performance is also needed for wave-transparent materials. Silica aerogel with light-weight, low thermal conductivity, low dielectric constant and loss is a good candidate material to meet above demands. However, silica aerogel adsorbs water in atmosphere and leads to the degradation of dielectric properties. This article reports waterproofed silica aerogel material with excellent dielectric and thermal insulation properties. It was showed that the water adsorption decreased from 4.5wt% to 0.5wt% under room temperature before and after waterproofing treatment, while the dielectric loss tangent and thermal conductivity were 5*10-3 and 0.021 W/(m•K) respectively. In addition, the dielectric and insulation performance of the silica aerogel kept as good as the as-synthesized sample after 1 year in the ambient environment.