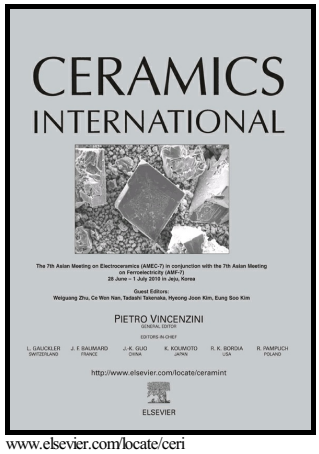

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Facile synthesis of hydrophobic, thermally stable, and insulative organically modified silica aerogels using co-precursor method

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Abstract

Silica aerogels have low density and high specific surface area, but there are restrictions regarding their durability and commercialization owing to their fragile nature and the strong moisture absorbing behavior of the siloxane network. To overcome these restrictions, this study evaluated hybrid organically modified silica (ORMOSIL) aerogels by employing 3-(trimethoxysilylpropyl) methacrylate (TMSPM) in tetraethyl orthosilicate (TEOS) through a two-step sol-gel co-precursor method. The methacrylate organic groups were incorporated into the silica networks via reactions between the Si-OH moieties in silica aerogels, resulting in ORMOSIL aerogels. The properties of the ORMOSIL aerogels were strongly affected by the amount of TMSPM co-precursor. The highest concentration of TMSPM (30 wt%) resulted in ORMOSIL aerogels with improved characteristics when compared with the pristine TEOS silica aerogels, such as hardness (0.15 GPa), Young's