

Development and characterization of silica aerogel using olivine silica as a sustainable precursor

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Abstract:

Silica aerogel is a type of advanced lightweight material with 99% air content which shows unique properties and applied in many industrial fields. However, the energy consumption during synthesis of silica aerogel is relatively high. In this research, it was discovered sodium silicate derived from olivine, an abundant mineral in earth crust, can be used as the silica precursor to produce silica aerogel. The hydrophobic silica aerogel from olivine is developed with a low temperature synthesis route via ambient pressure drying. The silica aerogel features a narrow pore size distribution and super hydrophobicity. Moreover, it is found that the pH of the silicic sol and the aging time can significantly influence the pore size and particle size of the silica network by altering the sol-gel and Ostwald ripening processes.

Key words: Silica aerogel; Sodium silicate; Olivine; Sol-gel; Hydrophobic

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