

## Development of Water-Based Thermal Insulation Paints Using Silica Aerogel

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**Abstract :** Insulation plays a key role in the sustainable building due to the contribution of energy consumption reduction. Without sufficient insulation, a great amount of the energy used to heat or cool a building will be lost to the outdoors. In this study, we developed a highly efficient thermal insulation paint with the incorporation of silica aerogel. Silica aerogel, with a low thermal conductivity of 0.01 W/mK, has been successfully prepared from the solid waste from the incineration plants. It has been added into water-based paints to increase its thermal insulation properties. To investigate the thermal insulation performance of silica aerogel additive, the paint samples were mixed with silica aerogel at different sizes and with various portions. The thermal conductivity, water resistance, thermal stability and adhesion strength of the samples were tested and evaluated. The thermal diffusivity measurements proved that adding silica aerogel additive could improve the thermal insulation properties of the paint significantly. Up to 5 °C reductions were observed after applying paints with silica aerogel additive compare to the one without it. The results showed that the developed thermal insulation paints have great potential for an application in green and sustainable building.

**Keywords :** silica aerogel, thermal insulation, water-based paints, water resistant

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