

Silica aerogel based hybrid materials for the application of thermal insulation coatings

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The remarkable physical properties of silica aerogels including low density, high porosities, high specific surface area, very low thermal conductivity lead to great potential applications such as transparent superinsulation materials. In this study, the UV curable system consisting of various oligomers such as hexa aliphatic urethane acrylate (UP118), TMPTA, HDDA, and photoinitiator(Irgacure 184) was employed as an organic binder. However, the incorporation of the hydrophobic aerogel with an organic binder is very limited due to dissimilar surface property between two materials. Accordingly, we used aerogels modified by surfactant adsorption method. The prepared hybrid coating sol was used to coat polycarbonate sheet via bar coating method, and then the coated samples were cured by uv radiation. The effects of aerogel content on the morphology, optical transmittance, and interfacial adhesion of the coated film were investigated. In addition, the thermal conductivity of coated film was measured using laser flash analysis (LFA) method to evaluate the thermal insulation property.