

Variations of physical properties of the polyurethane foams containing silica particles

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Polyurethane foams (PUFs) have a variety of applications such as sound absorption and seat cushioning materials. For seat materials, comfort properties are very important to provide comfort for passengers. Various studies have been conducted to improve the comfort properties. The comfort properties are related to physical properties. These properties are strongly dependent on foam morphology and the morphology also related to the hard and soft segments of the PUFs. In this study, we synthesized PUFs by adding silica particles during the PUFs polymerizing reactions. The hydroxyl groups attached on the silica particles surfaces can form chemical bonds by reaction with isocyanate groups. Therefore, it is believed that hard segments can be concentrated around the silica particles. In comparison, non-reactive surfaces of the silica particles, replaced with methyl groups, can be also examined. We used a universal testing machine (UTM) to analyze sag factor, hysteresis loss, and compression set as main factors for the comfort properties and a scanning electron microscopy (SEM) was used to observe foam morphology.