

Improved acoustic and physical properties of polyurethane composite foams with cellulose nanofibers

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Polyurethane foams are commonly used as sound absorbing material because of their porous structure. The sound waves are absorbed by the friction with air molecular or vibration of cell wall after penetrating the polyurethane foam. Therefore, sound absorbing property of polyurethane foams are depending on their morphology and damping property. In order to strengthen their properties, the cellulose nanofibers were used as a filler. The hydroxyl groups in cellulose nanofibers can form urethane linkages through the reactions with isocyanates for network structure. Scanning electron microscope was used to analyze the morphology of polyurethane composite foams with cellulose nanofibers. Dynamic mechanical analysis was also performed to investigate thermomechanical properties. For the acoustic of polyurethane composite foams, sound absorption coefficients were measured using an impedance tube method. Compression strengths were additionally examined to ensure durability of polyurethane composite foams.