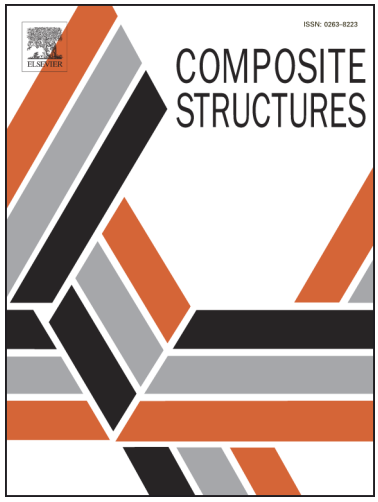

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FLAMMABILITY, MECHANICAL PROPERTIES AND STRUCTURE OF RIGID POLYURETHANE FOAMS WITH DIFFERENT TYPES OF CARBON REINFORCING MATERIALS

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Abstract

This paper investigates the reinforcement of rigid polyurethane foams with carbon nanotubes or graphite in order to improve their mechanical and thermal properties as well as fire resistance. A small addition of carbon nanotubes (up to 0.05 wt.%) improves the mechanical strength by about 20%, which was attributed to the strengthening effect of nanotubes and the change in the foam structure, i.e. the smaller size of pores and their narrower distribution. For higher nanotube content, the pore size does not change but the overall porosity significantly increases which results in a decrease in the mechanical strength. The thermal stability of nanocomposite foams and their flammability increase as a result of the formation of a carbon layer forming at the polymer surface. The addition of graphite greatly improves the fire resistance of polyurethanes foams but significantly deteriorates the bending strength due to the poor adhesion to the polyurethane matrix.