

Carbon Nanoparticle Influence on Polyurethane Foams Obtained from Residues of PET Industry

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Due to high mechanical properties, high electric and thermal conductivity a great deal of interest have attracted carbon nanotubes (CNT). Likewise increased interest are receiving lightweight materials such as polyurethane foams (PU). By mixing and dispersing CNT in PU systems, it is possible to obtain composites with whole new set of properties which facilitate formation of conductive antistatic smart materials, for example, for use in automotive engineering.

In this work we report the preparation of microcellular PU/CNT nanocomposites with different CNT loadings (0.18-0.46%) and isocyanate (NCO) indexes (110-260). As a blowing agent water was used. Density of all obtained samples was $200 \pm 5 \text{ kg/m}^3$. Electrical properties, heat conductivity mechanical properties as well as cell morphology were investigated.

The most significant effect on reduction of electrical resistivity can be reached if NCO index in nanocomposites is low. Volume electric resistivity for PU foams with NCO index 110 and CNT content even 0.18 is 5 to 6 orders lower, than without additives. Increasing amount of nanoparticles, electric resistivity decreases. Increasing NCO index, CNT influence on PU foam electric conductivity decreases – adding 0.46%, volume resistivity reduces only by 2 orders, in case of NCO index 260.

During the work it was found that adding CNT, tensile strength and modulus of elasticity decreases. Likewise NCO index do not influence these results considerably. Improvement in compression strength and modulus of elasticity is not significant. Heat conductivity of prepared composites is not affected neither by NCO index, neither concentration of dispersed particles. It is in the range between 31 and 33 mW/m·K.

The results have proved that it is possible to vary PU foam resistivity in a wide range. It provides opportunity to obtain conductive or dielectric material, which could be used as smart material in automotive industry.

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