DILATOMETRIC BEHAVIOR OF FLUOROPLASTIC CONTAINING CARBON NANOTUBES

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Nanomaterials and nanocomposites are current issues and the challenge of the near future. Several specialists are working hard to develop and improve the physicochemical characteristics of these new associations for their integration in the industry.
The purpose of this paper is the dilatometric study of fluoroplastic containing carbon nanotubes.
The resulting material has a disk shape with 3 mm thickness. Samples for dilatometry were collected from two different regions of the disk (center and periphery) to study the anisotropy. Then, from each region two samples were taken one in the radial direction and the second is oriented in the vertical direction of the disk (pressing axis). Measures of thermal expansion coefficient $\alpha_R(T)$ (radial direction) and $\alpha_Z(T)$ (pressing direction) as a function of temperature were carried out.
The curves obtained in the radial direction and the pressing direction of samples cut on the periphery of the disk give different results. According to the radial direction $\alpha_R(T)$ varies monotonically over a wide temperature range. Around 210°C, appears a peak of low intensity. At 250°C, another dilatometric anomaly very intense appears extending over 40°C. The value of the thermal expansion coefficient $\alpha_R(t)$ exceeds 2500 10^{-6} C^{-1}. From 260°C, $\alpha_R(t)$ becomes monotonous. The variations are practically nil.
Curve $\alpha_Z(T)$ has a completely different behavior compared with $\alpha_R(T)$. From room temperature to 160°C, $\alpha_Z(T)$ is almost constant. Between 180 ° C-220 ° C, appears a relatively intense dilatometric anomaly extending over 40°C. Around 290°C, a second peak very intense appears. It is twice as intense as the first. Its intensity is about 2000 10^{-6} C^{-1}. The expansion behavior of the material varies greatly from the radial direction to the vertical direction. This shows that the compound is anisotropic.

Keywords: fluoroplastic, carbon nanotubes, anisotropy, dilatometry.