

Composites of poly(vinyl chloride) with POSS

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Abstract:

The nanocomposites of poly(vinyl chloride) (PVC) with silsesquioxane have been prepared by melt processing. The suspension PVC with a K value = 61, $M_w / M_n = 2.25$ was applied. The PVC dry blend containing the organotin stabilizer and Mark 17 MOK (produced by Crompton) and 1 part by weight of paraffin wax Loxiol G22 2 (produced by Henkel) was applied as the matrix of investigated nanocomposites.

The methacryl - POSS were introduced into the PVC during dry blend homogenization and directly to the kneading chamber at the moment PVC gelation. The concentration of POSS was 5, 10 and 15 wt. %. It was found that the POSS act as plasticizers leading to a certain decrease of modulus and glass transition temperature. Based on the DMTA measurements, performed for two frequencies 1 Hz and 10 Hz as a function of the temperature, a POSS concentration dependent decrease of the T_g in the range from 80°C (for a neat PVC) to about 55°C for the highest POSS content was found. A similar effect was found concerning the decrease of storage modulus.

Another significant gain by this type of nanocomposites was an increase of the thermal stability of the PVC matrix, as determined by TGA tests. An influence of POSS modification on tensile fracture type of the PVC nanocomposites was ascertained, indicating a various resistance of these composites on the tensile elongation.