

论文

聚丙烯/多壁碳纳米管复合材料的热性能和流变性能

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摘要 用熔融共混法制备了聚丙烯多壁碳纳米管(PP/MWNTs)复合材料, TGA研究表明在氮气气氛下碳纳米管显著增加了聚丙烯基体的热稳定性. 3wt%MWNTs可使PP热分解起始温度提高44℃. 非等温结晶研究表明MWNTs对PP基体的结晶行为没有明显的影响. 流变测试结果表明PP/MWNTs复合材料的储能模量 G' 和损耗模量 G'' 随着MWNTs含量增加逐渐增大. 1wt%MWNTs的PP聚合物的零剪切粘度最低, 5wt%MWNTs的PP聚合物的零剪切粘度最高, PP和3wt%MWNTs的PP纳米聚合物的零剪切粘度居于二者之间, 随着频率的增加, 剪切稀化作用越来越明显, 呈现出假塑性流体行为. 含5wt% MWNTs的PP复合材料的体积和表面电阻率与纯PP相比分别下降了9个和4个数量级, 表明少量的MWNTs可以显著改变PP的电学性能.

关键词 [碳纳米管](#) [聚丙烯](#) [纳米复合材料](#) [熔融共混](#) [流变行为](#)

分类号

THE THERMAL CHARACTERIZATION AND RHEOLOGY BEHAVIOR OF PP/MWNTs NANOCOMPOSITES

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Abstract Nanocomposites based on polypropylene(PP)and multi-walled carbon nanotube(MWNTs)were manufactured by melt blending. Thermal gravimetric analysis(TGA)showed that carbon nanotubes significantly enhanced the thermal stability of polypropylene in nitrogen. The temperature of onset decomposition was 44 K higher than that of neat PP for nanocomposites with 3wt% of MWNTs loaded The effect of MWNTs on the crystallization and melting behavior of polypropylene was not observed. Rheological behavior of PP / MWNTs nanocomposites showed that storage modulus(G')and loss modulus(G'')increased with increasing nanotube content. At low frequency. the steady shear viscosity of nanocomposites with 1 wt%of MWNTs was minimal and that of the sample with 5 wt% nanotube was maximal. Shear thinning tendency increased with increasing frequency. The volume resistivity and surface resistivity of nanocomposite with 5 wt%MWNTs were 9 and 4 order of magnitude. respectively lower than those of the neat PP. It shows that the electrical conductivity can be improved obviously by incorporating a little MWNTs.

Key words [Carbon nanotube](#) [Polypropylene](#) [Nanocomposite](#) [Melt blending](#) [Rheological behavior](#)

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