



Effect of dispersion methods on the performance of novel rigid copolymer polyurethane nanocomposites based on graphene nanofillers

Muayad Albozahid^a, Haneen Zuhair Naji^b, Zoalfokkar Kareem Alobad^c, and Alberto Saiani^d

^aDepartment of Materials Engineering, Faculty of Engineering, University of Kufa, Najaf, Iraq; ^bDepartment of Chemical Engineering, Faculty of Engineering, University of Babylon, Hilla, Iraq; ^cDepartment of Polymers Engineering and Petrochemical Industries, Faculty of Materials Engineering, University of Babylon, Hilla, Iraq; ^dSchool of Natural Sciences, Department of Materials, University of Manchester, Manchester, UK

ABSTRACT

The Rigid Copolymer Polyurethanes (RCPUs) as nanocomposites were synthesized by in-situ polymerization (ISP), melt compounding (MC), and solution mixing (SM) with wide range of weight ratios of graphite nanoplatelets (GNP). The blending process was utilized to obtain well-dispersed of GNP and thus strong interaction, leading to an effective performance of the RCPU/GNP nanocomposites. The structure of RCPU/GNP nanocomposites was studied using FTIR test. The thermal stability of RCPU nanocomposites was seen by TGA analysis, showing an increase with addition of GNP nanofillers. Rheology analysis revealed network formation with well-dispersed GNP regarding different dispersion approaches. Thermal and electrical tests were also conducted, approving that dispersion and interaction of GNP can play a crucial role in enhancing the thermal and electrical properties. Such a significant improvement in RCPU matrix performance could lead to the use of this material for different application.

ARTICLE HISTORY

Received 27 July 2021
Revised 6 October 2021
Accepted 7 October 2021

KEYWORDS

Rigid copolymer polyurethane; RCPU; FTIR; waxes; TGA; rheology; thermal conductivity and electrical conductivity

