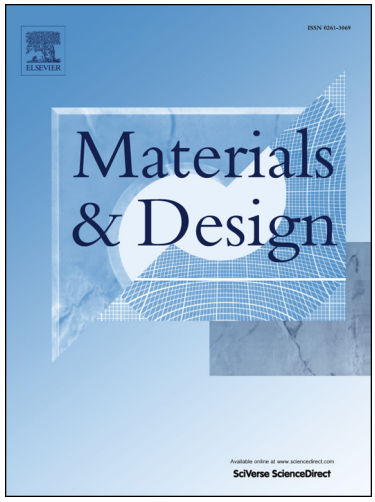

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Reza Eslami-Farsani, S. Mohammad Reza Khalili, Ziba Hedayatnasab, Neda Soleimani

PII: S0261-3069(13)00636-5
DOI: http://dx.doi.org/10.1016/j.matdes.2013.07.012
Reference: JMAD 5632

To appear in: *Materials and Design*

Please cite this article as: Eslami-Farsani, R., Mohammad Reza Khalili, S., Hedayatnasab, Z., Soleimani, N., Influence of thermal conditions on the tensile properties of basalt fiber reinforced polypropylene-clay nanocomposites, *Materials and Design* (2013), doi: http://dx.doi.org/10.1016/j.matdes.2013.07.012

Influence of thermal conditions on the tensile properties of basalt fiber reinforced polypropylene-clay nanocomposites

Reza Eslami-Farsani[a,1], *S. Mohammad Reza Khalili*[a,b], *Ziba Hedayatnasab*[a], *Neda Soleimani*[a]

[a] Centre of Excellence for Research in Advanced Materials and Structures, Faculty of Mechanical Engineering, K. N. Toosi University of Technology, Tehran, Iran.
[b] Faculty of Engineering, Kingston University, London, UK.

Abstract

In this paper, a comparative study on the tensile properties of clay reinforced polypropylene (PP) nanocomposites (PPCN) and chopped basalt fiber reinforced PP-clay nanocomposites (PPCN-B) is presented. PP matrix are filled with 1, 3 and 5 wt. % of nanoclays. The ultimate tensile strength, yield strength, Young's modulus and toughness are measured at various temperature conditions. The thermal conditions are included the room temperature (RT), low temperature (LT) and high temperature (HT). The basal spacing of clay in the composites is measured by X-ray diffraction (XRD). Nanoscale morphology of the samples is observed by transmission electron microscopy (TEM). Addition of nanoclay improves the yield strength and Young's modulus of PPCN and PPCN-B; however, it reduces the ultimate tensile strength. Furthermore, the addition of chopped basalt fibers to PPCN improves the Young's modulus of the composites. The Young's modulus and the yield strength of both PPCN and PPCN-B are significantly high at LT (-196 °C), descend at RT (25 °C) and then low at HT (120 °C).

Keywords

Polypropylene; Nanocomposites; Basalt Fibers; Low Temperature; High Temperature; Tensile Properties

[1]Corresponding author, Centre of Excellence for Research in Advanced Materials and Structures, Faculty of Mechanical Engineering, K. N. Toosi University of Technology, No. 17, Pardis St., Molasadra Ave., Vanak Sq., Tehran, Iran, Tel.: +98 2184063218; fax: +98 2188674748, E-mail address: eslami@kntu.ac.ir (R. Eslami-Farsani).