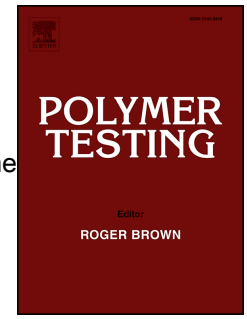
Accepted Manuscript



Dynamic shear rheology behavior and long term stability kinetics of reduced graphene oxide filled poly (vinyl alcohol) biofilm

Bhasha Sharma, Shashank Shekhar, Sanjeev Gautam, Purnima Jain

PII: S0142-9418(18)30676-7

DOI: 10.1016/j.polymertesting.2018.06.019

Reference: POTE 5516

To appear in: *Polymer Testing*

Received Date: 24 April 2018

Revised Date: 30 May 2018

Accepted Date: 16 June 2018

Please cite this article as: B. Sharma, S. Shekhar, S. Gautam, P. Jain, Dynamic shear rheology behavior and long term stability kinetics of reduced graphene oxide filled poly (vinyl alcohol) biofilm, *Polymer Testing* (2018), doi: 10.1016/j.polymertesting.2018.06.019.

Dynamic Shear Rheology behavior and long term stability kinetics of Reduced Graphene Oxide filled Poly (Vinyl Alcohol) biofilm

Bhasha Sharma, Shashank Shekhar, Sanjeev Gautam, Purnima Jain

Advance Centre of Polymer Science, Department of Chemistry, School of Applied Science,

Netaji Subhas Institute of Technology, University of Delhi, India

E-Mail (prnmnsit@gmail.com)

Abstract

Rheological measurements of bionanocomposites thin films were studied by incorporating chemically reduced graphene oxide in PVA matrix. To examine the effect of reduction of graphene oxide in PVA matrix and its viscoelastic behavior, rheological tests have been conducted. SEM and optical morphology exhibits consistent dispersion of nanoparticles due to the interaction of strong hydrogen bonding in PVA and the presence of other amine functionalities in RGO. TEM micrographs are in agreement with the SEM results and estimated 50-75 nm RGO particle size. The viscosity of solutions results in shear thinning or pseudo plastic behavior and enhancement in elastic behavior is observed on addition of nanofiller. Flow behavior of nanocomposites estimated that lowest value of stress is constrained to induce the flow of material. Incorporation of RGO has immense effect on curing behavior of polymer by arresting the segmental mobility of polymeric chains. Frequency sweep results enquired that 1% RGO has highest long term stability in comparison to pristine PVA. The linear viscoelastic region revealed that the nanocomposites can withstand 0.01 s^{-1} strain rate without any deformation as a function of frequency. It is investigated that viscosity is decreasing with increasing shear rate at ambient temperature which means the resultant product can be well suited for coating or paint applications.

Keywords: RGO; Polarizing Optical Microscopy; Viscoelastic behavior; TEM.