EFFECT OF FILLER LEVEL ON RHEOLOGICAL PROPERTIES OF POLYLACTIDE/MONTMORILLONITE NANOCOMPOSITES

Rahul K. Gupta* and M. Jollands

Rheology and Materials Processing Centre, School of Civil, Environmental and Chemical Engineering, RMIT University, 124 Trobe St, Melbourne, Vic 3000, Australia

Corresponding Author: rahul.gupta@rmit.edu.au

A dynamic oscillatory shear rheometry study was carried out for a melt mixed intercalated PLA nanocomposite. Polymer nanocomposite samples were prepared by melt mixing PLA with 4wt% montmorillonite (MMT) clay. It showed enhanced complex viscosity in the low frequency region as filler levels were increased from 2 to 6 wt%. There was no enhancement at high frequencies. Due to the polymer-filler and filler-filler interactions, the storage and loss modulus showed pseudo solid-like behavior in the low frequency region. The percolation threshold for this system was estimated as 3.4 wt % (2.1 vol %), in close agreement with the optimum level of filler for mechanical properties (3.6 wt %). This threshold level is consistent with percolation model predictions for 2D random in the plane orientation with a high aspect ratio. Keywords: biopolymers, nanocomposites, network, rheology, structure-property relations