

P-18-167

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

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A dynamic oscillatory shear rheomety 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