DISPERSION AND ORIENTATION
OF ORGANICALLY MODIFIED
MONTMORRILONITE IN NYLON 6 MATRIX
BY A NOVEL FABRICATION METHOD

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ABSTRACT

In this research, organically modified Montmorillonite (oMMT) was dispersed and oriented within Nylon 6 utilizing a new processing technique to create nano-engineering films. Nylon 6 (N6) nanocomposites (NCs) containing 0.1wt% to 5wt% of oMMT were directly prepared in the High Shear Thin Film Machine (HSTFM) which we designed and fabricated. Using the HSTFM, we produced NC films with good dispersion and simultaneously good orientation. Transmission Electron Microscopy (TEM) was used to characterize the dispersion and orientation of the oMMT in the Nylon6 matrix. Mechanical properties of the NCs were studied through tensile tests and Dynamic Mechanical Analysis (DMA). At 5% oMMT in N6 Young modulus is increased by 66% when compared to neat Nylon 6. XRD analysis result shows that the dispersed 5wt% oMMT/N6 NCs exhibit predominantly $\gamma_2$ crystal form; however when this sample was processed to include orientation, the $\alpha_2$ crystal form became predominant. Results from these analyses will be presented.