

Comparative studies of thermo-mechanical and morphological properties of polylactic acid/fumed silica/clay (1.28E) and polylactic acid/fumed silica/clay (1.34TCN) nanocomposites

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Abstract In this study, nanocomposites were prepared using polylactic acid (PLA), fumed silica (fsi) and nanoclay through solution-intercalation film-casting technique. Thermo-mechanical and morphological properties of developed nanocomposites were successively characterized by scanning electron microscopy (SEM) analysis, tensile test and thermogravimetric analysis (TGA). Throughout the findings, it proved that 2 wt% of clays was the optimum filler loading compared to 5 and 10 wt% in the PLA-fsi-clay nanocomposites. Furthermore, among the clays used, clay (1.28E) showed the better performance compared to clay (1.34TCN) to be introduced in the nanocomposites. The incorporation of 2 wt% of clay (1.28E) showed the best compatibility with PLA-fsi matrix with smooth surface. Besides, 2 wt% of PLA-fsi-clay (1.28E) nanocomposite showed the highest tensile strength and modulus. TGA result showed that 2 wt% of clays especially clay (1.28E) had the highest thermal stability. Both clay and fumed silica were well intercalated with PLA matrix enhanced the thermo-mechanical and morphological properties of the nanocomposites.

Keywords Nanocomposites · Clay · Compatibility · Adsorption · Stability

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