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Enzymatic degradation behavior of nanoclay reinforcedbiodegradable PLA/PBSA blend composites

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Abstract

Films of a biodegradable PLA/PBSA blend and blend-composites containing 2 wt% of C20A, C30B and MEE were prepared by solvent casting and spin coating. The films were incubated in vials containing Tris–HCl buffer with Proteinase K, and their weight losses were measured after enzymatic degradation. The surface morphology before and after degradation tests was studied by SEM and in situ AFM. The results showed that neat PLA had a lower percentage weight loss than neat PBSA, whereas blending them resulted in an increased weight loss. The incorporation of C20A into the as-prepared blend accelerated the degradation rate, whereas C30B and MEE decelerated the degradation rate. Annealing at 70 °C reduced the degradation rate of the blend, and the presence of nanoclays further reduced the degradation rates. Annealing at 120 °C dramatically decelerated the degradation of the blend, whereas the incorporation of nanoclays accelerated the degradations rates. The enhancement of the degradation rates in the presence of nanoclays indicated that the degradation rates were mainly controlled by the PLA matrix. Thin films were also cast onto a silicon substrate using a spin coater, and enzymatic degradation on the completely crystalline surfaces revealed that enzymatic attack occurred by pitting and surface erosion of the thin films.