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MORPHOLOGY–PROPERTY RELATIONSHIP OF POLYMER BLENDS BASED ON ENVIRONMENTALLY BENIGN POLYMERIC MATERIALS AND ORGANOCLAY

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Polymer composites based on biodegradable polylactide/poly[(butylene succinate)-co-adipate] (PLA/PBSA) blend and pristine and organically modified montmorillonite (OMMT) have been prepared via melt-mixing in a batch-mixer. Four different surfactants have been used to modify the pristine MMT. The weight ratio of the PLA and PBSA is 70:30, while the weight of the MMT is fixed at 6%. The surface morphologies of the unmodified and OMMT-modified blends have been studied by field-emission scanning electron microscopy. Results show that the domain size of the dispersed PBSA-phase is reduced with the addition of OMMT and the extent of this reduction in the size of PBSA domain is dependent on not only the interlayer spacing of the clay but also enthalpic interaction between the clay surface and the polymer blend. The degree of dispersion of silicate layers in the blend matrix has been characterized by X-ray diffraction. The improved adhesion between the phases and the fine morphology of the dispersed phase contributes to the improvement in the mechanical and thermal properties of the final polymer blend-OMMT composites over PLA/PBSA blend. On the basis of these results, we propose a general understanding on how the morphology of the blends is related to the final properties.