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A new insight into morphological, thermal, and mechanical properties of melt-processed polylactide/poly(Ɛ-caprolactone) blends

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Highlights

- PLA/PCL blends with different compositions are processed using melt-blending.
- The relationship between the obtained morphology and properties is reported.
- Unique thermal stability of dispersed phase improves the degradation of blends.
- 60PLA/40PCL blend shows significantly improved thermal stability and mechanical properties.
- The results inform technologically advanced PLA-based materials for commercial applications.

ABSTRACT: Biodegradable polylactide (PLA)/poly(Ɛ-caprolactone) (PCL) blend is a well-studied immiscible polymer blend system; however, there is no fundamental understanding of how the dispersed phase morphology controls the thermal stability, and the thermal and mechanical properties of the blend systems. Addressing this research question, a series of PLA/PCL blends were processed using melt-blending technique. The results show that the unique thermal stability of the dispersed PCL domains prolonged the complete degradation process of PLA. Furthermore, altering the activation energies (E_a) of PLA/PCL blends revealed that thermal stability depends not