

250c Microcellular Polylactide (Pla) Nanocomposites

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Wide-spread applications of biobased plastics can (1) reduce our dependency on diminishing fossil resources, (2) lead to a more balanced CO₂ level in the atmosphere, and (3) reduce the amount of persistent plastic waste. However, their current market penetration has been slow due to several challenges including (1) high cost, (2) narrow processing window, and (3) inferior material properties. Microcellular injection molding allows the materials to be processed at a much lower temperature because the supercritical fluid acts as a plasticizer to reduce the viscosity and transition temperatures of the polymer melt. This makes it an attractive process for biobased plastics which are inherently prone to thermal and moisture related degradation. In addition, components made from the microcellular injection molding process also consume less materials leading to a lower cost while exhibiting superior dimensional stability and better impact performance due to the microcellular structure. Recent research has shown that the presence of nano-fillers in microcellular composites helps to produce better cell structures and cell distributions, whereas the addition of supercritical gas in microcellular injection molding facilitates dispersion of nano-fillers in nanocomposite, resulting in better microstructure and strength-to-weight ratio. This paper will report the synergistic effects of adding two types of montmorillonite (MMT) nanoclays, namely Cloisite®30B and Cloisite®20A at different levels on the cell morphology and mechanical properties of Polylactide (PLA), a biobased polymer made from corn. The polylactide nanoclay composites were compounded via a melt compounding process.