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Morphology of Renewable Polylactide / Soybean Oil Blends Compatibilized by Block Copolymers¹ MEGAN ROBERTSON, KWANHO CHANG, MARC HILLMYER, University of Minnesota-Twin Cities — Renewable composites derived from polylactide and soybean oil (soy) were prepared by melt blending. The blend morphology was tuned with the addition of poly(isoprene-*b*-lactide) block copolymers. Due to the extreme differences in the viscosities of soy and polylactide, a critical block copolymer block ratio was found to induce a phase inversion in which the morphology changed from soy droplets in a polylactide matrix to polylactide droplets in a soy matrix, even though soy was the minority component. This transition was not only due to the thermodynamic interactions between the block copolymer and the two immiscible phases, but also was a result of shear forces acting on the mixture during melt blending. The droplet size of the soy droplets in the polylactide matrix was also highly dependent on the block copolymer composition. In binary polylactide/soy blends there was a limiting concentration of soy which could be incorporated into the polylactide matrix (5 percent of the total blend weight) due to the mismatch in viscosities resulting in the loss of soy during mixing. The addition of block copolymer with an appropriate block ratio allowed full incorporation of soy up to 20 percent of the total blend weight.

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