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Biaxial orientation processes are commonly used to enhance the performance of polymeric materials. The development of molecular orientation during biaxial forming processes enables to produce materials that can be used in demanding structural applications or with enhanced optical or barrier properties. In this work, a laboratory biaxial stretcher, which enables to simulate typical industrial processes often encountered in polymer film processing where deformation of a sheet takes place in both machine (MD) and transverse (TD) directions, was used to study the deformation behavior of poly(lactic acid) (PLA)/thermoplastic starch (TPS) blends. The influence of processing conditions on the structure development, maximum stretchability and mechanical performance was addressed.

PLA and TPS were first blended in various proportions via a twin screw extrusion process; wheat starch was used in all blends and plasticized with glycerol and water. The blends were subsequently cast into sheets and biaxially drawn. The addition of starch did not affect significantly the stretchability of the pure PLA. Even at high starch content (60 wt.%), the biaxial draw ratio at which the sample breaks is very similar to that of the pure PLA. At higher temperatures (above 90^{o}C), all blends could be stretched at significant biaxial draw ratios and very thin films could be obtained (below 20 microns). The starch content and processing variables affected the films crystallinity and final mechanical properties.