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Structural evolution under uniaxial drawing of Poly(D, L-lactide) Films GRÉGORY STOCLET, JEAN-MARC LEFEBVRE, ROLAND SEGUELA, Laboratoire de Structure et Proprietes de l Etat Solide — Aliphatic polyesters are an important class of biodegradable polymers. They have drawn particular attention in the last few years as food packaging materials because they can be derived from renewable resources. Among this family, polylactide (PLA) is considered as one of the most promising "green" polymer for use as a substitute to petroleum-based polymers. In the present work, we investigate the mechanical behaviour of amorphous poly(D, L-lactide) films in relation to the structural evolution upon stretching at various draw temperatures (Td) above the glass transition temperature. Examination of the drawing behaviour shows that PLA initially behaves like a rubbery material until a true strain of the order of 1. Strain hardening occurs beyond this strain level, up to film fracture. Such strain hardening is generally ascribed to a strain induced crystallization phenomenon. In the present case, it is clearly more pronounced for Td = 90 $^\circ$C than for Td = 70 $^\circ$C. The corresponding structural evolutions are investigated by means of WAXS. The diffraction patterns reveal the marked influence of draw temperature. Indeed for Td = 70 $^\circ$C a mesophase is induced whereas strain-induced crystallisation takes place at Td = 90 $^\circ$C. Further work is in progress, in order to elucidate mesophase development and mechanical response.

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