

PLASTICIZATION OF POLY(LACTIC ACID) THROUGH BLENDING WITH OLIGOMERS OF LACTIC ACID: EFFECT OF THE PHYSICAL AGING ON PROPERTIES

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ABSTRACT

Two esters of lactic acid oligomers (OLAs), carboxyl (OLA-COOH) or hydroxyl (OLA-OH) end capped, have been tested as plasticizers for poly(lactic acid). Materials containing up to 25 wt. % by weight of OLAs were prepared by melt blending and their mechanical, thermal and transport properties were tested as a function of blend composition. Prepared materials were aged in controlled temperature and humidity conditions and the effects of aging on phase structure and properties was studied.

Glass transition temperature decreased with increasing OLA content, in agreement with Couchman-Karasch model. Blends containing more than 20 wt% of OLAs showed an increased ductility; aging was shown to increase tensile modulus and strength of plasticized materials while slightly reducing the elongation at break. A broad distribution of molecular mobility was evidenced in plasticized blends and its influence on the aging was pointed out. The total migration of plasticized materials in food simulants was below the limit of EU regulations.

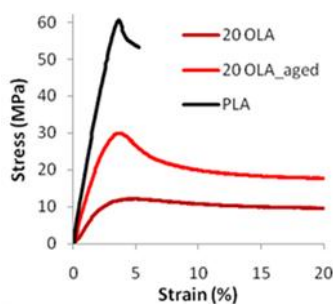


Fig. 1: Tensile curve of aged and unaged samples of PLA-OLA ble