



Chemical recycling of degradable poly(lactic acid) employing alcoholysis reaction of glycerol

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Chemical recycling is one of efficient processes for converting polymeric wastes to other value-added raw materials or products. This work is aimed to develop a chemical recycling process for post-consumer products of degradable poly(lactic acid) or PLA by employing alcoholysis reaction with glycerol, and microwave irradiation as a heat source. Effects of reaction conditions, in terms of PLA/glycerol feed compositions, reaction temperature and time, on chemical structures and molecular weight of the resulting products are investigated by ¹H-NMR, FTIR, GPC, and HPLC. Optimal conditions are determined to obtain products with specific structures and properties. The results show that the product obtained from a 2:1 glycerol:PLA feed ratio at 240°C for 15 min possesses 3-branched structures of lactate oligomers with an average length of 12 repeat units. The product is then used as additive for toughening of PLA resin. Results from tensile experiments show that an addition of 0.5% of the product leads to an increase in tensile strength of PLA from 54.4 to 61.7 MPa, and elongation at break from 2.92 to 3.29 %.

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