

Preparation of PLLA with high-molecular weight using Sn(Oct)₂ and ZnO as a co-catalyst under the bulk condition

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Poly(L-lactic acid) (PLLA) has attracted as biomedical applications such as surgical implants, drug delivery systems, and ecological materials due to biocompatible, biodegradable characters, and semi-crystalline structure.

PLLA has usually been synthesized by bulk polymerization of L-lactide with appropriate catalyst like tin compounds, SnCl₄ or Sn(Oct)₂ which known to be the most effective catalysts. However, there are not many studies of the effect of co-catalysts in polymerization of PLLA. In this study, PLLAs having high molecular weights were synthesized by bulk ring-opening polymerization of L-lactide with the various ratios of catalysts, stannous octoate (Sn(Oct)₂) and zinc oxide (ZnO). This study is the first case to control the molecular weight of PLLA by varying the ratio of Sn(Oct)₂ and ZnO. As ZnO is added for co-catalyst, it is effective for growing chains of PLLA and preventing back-bite reaction in the overall conditions. As a result, this study shows a significant effect of ZnO as a co-catalyst on the molecular weight of PLLA.