

Fabrication of Curable Poly(lactic acid-co-glycidyl methacrylate) Copolymers and their Use in Cosmetic and Biomedical Applications

Pakorn Opaprakasit

School of Bio-Chemical Engineering and Technology, Sirindhorn International Institute of Technology (SIIT),
Thammasat University, Pathum Thani, 12120 Thailand

Phone +66(2) 986-9009~13 Ext. 1806, Fax +66(2) 986-9009~10 Ext.1800, *E-mail: pakorn@siit.tu.ac.th

Abstract

Poly(lactic acid) has attracted vast attention in both industrial and research community, and has been widely used in many applications, due to its unique biocompatibility and degradability. Introducing of other monomers to its structures leads to improvements in its properties and provides specific functionality for further developments. In our laboratory, poly(lactic acid-co-glycidyl methacrylate), P(LLA-co-GMA), copolymers have been systematically synthesized by ring-opening polymerization. The materials exhibit biodegradability and biocompatibility and can be crosslinked by employing thermo- or photo-curing reactions. Fabrication processes for these copolymers have been developed for use in cosmetic and biomedical applications. Suspension crosslinking and phase inversion emulsification (PIE) processes have been employed in the preparation of micro- and nano-beads, with tunable structures, in which solid or hollow structures can be achieved. Effects of process conditions on structures, morphology, properties, and degradability of the materials are investigated. In addition, active compound-encapsulated particles have been prepared by employing various NSAID and antibiotic drugs and essential oils. Structures and properties of the resulting particles, and releasing behaviors of the active compounds are examined. These materials with tunable properties can be commercially applied in many products, especially as cosmetic scrub beads and drug-controlled release materials.

Keywords: Poly(lactic acid-co-glycidyl methacrylate), Encapsulation, Suspension crosslinking, Phase inversion emulsification, Cosmetic scrub beads, Drug-controlled release