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DESIGN OF A POLYMER DISPERSION STABILIZER FOR PREPARATION OF MONODISPERSE POLYLACTIDE MICROSPHERES

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Poly(dodecyl methacrylate)-*co*-poly(2-hydroxylethyl methacrylate) (PDMA-*co*-PHEMA), copolymers with dodecyl and hydroxy groups, were synthesized to use as a stabilizer for the dispersion polymerization of D,L-lactide (DLLA). The dispersion polymerization was carried out in xylene/heptane (1:2 in v/v) mixture solution at 368 K using PDMA-*co*-PHEMA and 2-ethylhexanoate as a catalyst. As a result, in the case with 1.25 mol% of HEMA, monodisperse PDLLA microspheres were obtained (particle diameter = 4.5 μm, coefficient of variation, *CV* = 4.89 %). Dynamic light scattering measurement showed that the presence of micellar aggregates for PDMA-*co*-PHEMA in the initial stage was one of the affecting factors to the polydispersity of the PDLLA microspheres prepared by dispersion polymerization. Furthermore, we investigated the time course of monomer conversion, particle diameter and *CV* to clarify the optimal molecular structure of PDMA-*co*-PHEMA for the preparation of monodisperse PDLLA microspheres. In the case with 1.25 mol% of HEMA, the monomer conversion and the particle diameter were increased with polymerization time, and the *CV* was decreased. In contrast, in the case with 2.30 mol% of HEMA, the monomer conversion and the particle diameter were increased with polymerization time, but the *CV* was not decreased, indicating that polydisperse PDLLA microspheres were prepared. In general, it is necessary for decreasing *CV* to sufficiently capture monomers into the particle in the growth stage. From the results obtained in this study, we found that the degree of monomer capturing depended on the adsorption of dispersion stabilizers. Consequently, the HEMA content, initiator of polymerization of D,L-lactide, in PDMA-*co*-PHEMA palys an important role for preparation monodisperse PDLLA microspheres.