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Title(English)	Effective Bioprocessing for Production of Polyhydroxyalkanoates with Tunable Properties
著者(和文)	MFADZIL FAKHRUL
Author(English)	Mohd Fadzil Fakhrul Ikhma Bin
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Thesis Outline

This thesis is divided into five chapters. Chapter 1 describes the general introduction about polyhydroxyalkanoate (PHA), as a promising material for sustainable consumption. The main focus of this research is to develop the production strategy of medium-chain-length (mcl) monomer-containing PHA by utilizing renewable resources. It is intended to improve the current PHA yield and tune the monomeric composition. This can be achieved by the employment of bioprocessing and post-bioprocessing methods for diversifying the available PHAs.

Chapter 2 presents an approach taken through homopolymerization for producing mcl-PHA homopolymers with high PHA yield. Employment of an intermittent feeding at a low concentration not only for fatty acids but also co-carbon sources enabled to acquire high PHA titer. Enrichment of culture medium with yeast extract was profound for supporting decanoate uptake leading for the highest poly(3-hydroxydecanoate), P(3HD) production so far, acquired at 5.4 g/L.

Chapter 3 describes an effective bioprocessing of poly(3-hydroxybutyrate-*co*-3-hydroxyhexanoate), P(3HB-*co*-3HHx) containing higher 3HHx fraction. The strategy was applied by growing a recombinant *Escherichia coli* strain with glycine auxotrophic complementation with palm kernel fatty acid distillate (PKFAD). The use of PKFAD as a renewable substrate provided the cost-effectiveness and sustainability of the developed production system. Feeding of the substrate at fairly low concentration (3 to 4 g/L per feed) led to the accumulation of 9.2 g/L P(3HB-*co*-3HHx) with 28 mol% 3HHx.

Chapter 4 discusses the bioproduction of P(3HB-*co*-3HHx) and P(3HHx) as strategies to produce tailor-made PHAs with diverse 3HHx content. The produced mcl-PHAs were blended with P(3HB-*co*-3HHx) containing 5 mol% and 11 mol% for further tuning the property of the materials. The blending of PHA materials with distant in the monomeric composition often resulted in being immiscibility. However, miscible blending was achieved by lowering the molecular weight of PHA with the addition of ethanol into the culture medium.

Chapter 5 summarizes the main conclusion of the thesis and provide an insight into the developed PHA materials, also presents an outlook for future work.