Biosynthesis of Biodegradable Polyester containing Lactate from renewable feedstock

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There has been big dependence on petroleum resource, leading to serious environmental pollution issue with depletion of limited fossil fuel. As the promising sustainable material, polyhydroxyalkanoates (PHAs) exhibit significant advantages over conventional petroleum-based plastic in that the microbial polyesters have biodegradability and biocompatibility with similar material properties to polypropylene. As the lactate-containing polyester, poly(3-hydroxybutyrate-*co*-lactate) (P3HBLA) is the thermoplastic copolymer showing fine thermal and mechanical properties desirable for various industries. In this study, the recombinant *Escherichia coli* was utilized to produce P3HBLA from glucose. The different engineered strains were applied by optimization of tailor-made PHA synthase mutant and propionyl-CoA transferase mutant. The microbial system led to high-level production and different monomer composition expressing different material properties in batch cultivation. The final strain showed much improved biosynthesis of P3HBLA from glucose in fed-batch fermentation, and polymer analysis was also conducted, suggesting its commercialization and practical application in various fields.