Unleashing the potential of enzymes for green furan-based polymer synthesis

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The enzymatic synthesis of polymers via non-metabolic pathways has a long history but was overshadowed by petroleum-based methods. However, due to the depletion of petroleum resources and rising costs, enzymatic polymerizations are experiencing a resurgence. By combining biobased monomers and enzymatic polymerizations, both the field of enzymatic polymerization and the use of renewable resources can be accelerated, contributing to sustainability in the polymer and coatings industry.

Furan derivatives and furan chemistry offer a biobased alternative to phenyl-based polymers, with 2,5-Furandicarboxylic acid (FDCA) being a promising biobased furan monomer. However, its potential is limited by the occurrence of decarboxylation during polymerization. To overcome this challenge, alternative synthesis routes are needed. Enzymatic polycondensation of biobased furan monomers with aliphatic comonomers has successfully produced furan-based polyesters, polyamides, and polyesteramides, offering a green and robust solution for sustainable polymer production.

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