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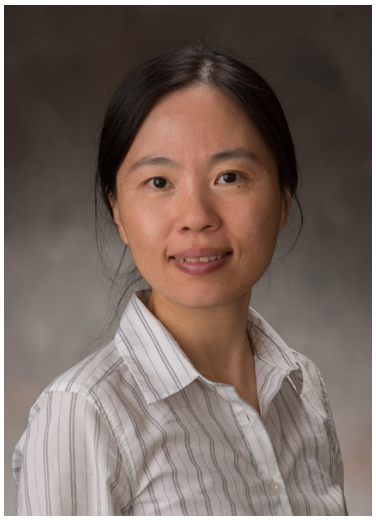
Cycle 11
January 2017



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Exploring Microbial metabolic Diversity for the utilization of Lignin-Derived Aromatics

Abstract.

Lignin is the second most abundant biopolymer on the earth. It is traditionally considered as the waste product in the processing of lignocellulosic material, which represents the primary feedstock for the production of biofuels. Since lignin constitutes 15-30% of the dry weight of lignocellulose, methods to enable the production of value-added products from lignin are critical for realizing the full economic potential of lignocellulosic material. In this proposed research, we will focus on exploring the metabolic diversity of microbes for the efficient conversion of lignin-derived aromatic compounds into C_6 building blocks of a variety of thermoplastics. Due to the heterogeneous nature of molecules obtained from lignin depolymerization, wild-type microbes will be screened for rapid metabolism of lignin-derived aromatics. An alternate strategy will be pursued in parallel to equip platform microorganisms with known degradation pathways of aromatic compounds. Biosynthetic pathways of C_6 compounds, including adipic acid, 6-hydroxy caproic acid, and 1,6-hexanediol, are designed using lignin-derived aromatics as the feedstock. The modular nature of the proposed pathways enables their facile assembly into microbial hosts obtained from both the screening and the engineering efforts.