

Targeted Enzyme Discovery Based on Omics Mining of Natural Lignocellulolytic Systems

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Plant feedstocks are at the leading front of the biomass-to-bioproducts industries. These activities have the potential to promote economical, social and environmental development worldwide, through sustainable scenarios related to energy production and petroleum-based materials replacement. Enzymes are the key to unlock stored energy in plant biomass, providing effective means to convert the recalcitrant and insoluble feedstocks into simple sugars and further into products. In the past years, our group has combined metagenomics, proteomics and high-throughput screening approaches to develop a collection of enzymes that degrade or modify glycosidic bonds derived from diverse sources, such as fungi, termites, hyperthermophilic bacteria, soil metagenomes and synthetic (artificial) genes. Along with a comprehensive biochemical and functional characterization, we have assigned enzymes to specific biotechnological applications, as well as correlated function with structure to better understand the molecular features of biomass and enzyme interactions.