

Establishing the Synthetic Potential of Geothermal Dehydrogenases



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Abstract:

This project will use biomass-derived ethanol to drive a new DYRKR (Dynamic Reductive Kinetic Resolution) approach to biocatalytic, asymmetric synthesis. Importantly, (1) thermophilic alcohol dehydrogenases, though both robust and enantioselective (preliminary results), have not yet seen synthetic application, and (2) dynamic kinetic resolution, though a timely research area, under development with hydrolytic enzymes (i.e. lipases, esterases), remains practically unexplored with dehydrogenase enzymes. The DYRKR methodology has the potential to take racemic compounds to single enantiomers, in one operation, thereby adding significant value. Importantly, ethanol is utilized as the terminal reducing agent, to regenerate the costly biochemical reducing agent, NADH, that is required by these enzymes. Ethanol is emerging from this work as a viable, cost efficient reductant for such biocatalytic processes.