Cluster Preface: Biocatalysis

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Abstract Enzymes are valuable catalysts in chemical synthesis because they offer levels of efficiency and product selectivity that surpass what can be achieved using traditional catalytic strategies. This Cluster highlights advances in this important field, highlighting different ways in which biocatalysis can be used in organic chemistry.

Key words biocatalysis, catalysis, enzyme, asymmetric catalysis, carbene transfer, cycloaddition, cascade reactions, photochemistry

Berkowitz and co-workers share their work conducting Hammett linear free energy relationship studies on a substrate promiscuous ketoreductase discovered by their lab. They find that the rate-determining step is dependent on the electronics of the substrate, with hydride transfer from NADPH being rate determining with β-keto esters and aldehydes, and acetal dehydration determining the rate with trifluoromethyl ketones.

Finally, Hyster highlights his groups recent developments in photoenzymatic catalysis with substrate promiscuous oxidoreductases. This work demonstrates that visible light irradiation is a viable mechanism for achieving new enzyme functions.

This Cluster serves as our first foray into this very exciting and impactful area of synthetic chemistry. As biocatalysis continues to grow in the coming years, we anticipate it will cement itself as a vital tool for modern chemical synthesis. This is an area where groups from across the world are making important advances and we are excited to see where it goes in the years to come.

References


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