BRC Science HighlightCooperative asymmetric reactions combining photocatalysisAugust 2018and enzymatic catalysis

Background/objective

- Biological catalysis and chemical catalysis have been increasingly developed for synthesis of value-added products.
- However, few chemoenzymatic systems have explored the cooperativity of biocatalysts and chemical catalysts.

Approach

- Photocatalysis and enzymatic catalysis can proceed under compatible reaction conditions.
- Many photocatalyst-enzyme pairs were tested for catalyzing photoisomerization and reduction reactions of alkenes.

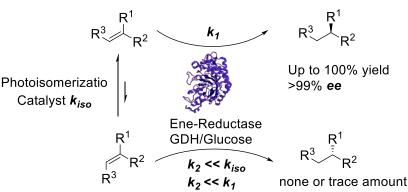
Results

Photocatalysts, which isomerize alkenes, combined with ene-reductases, which reduce carbon-carbon double bonds, can generate a variety of valuable enantioenriched products.

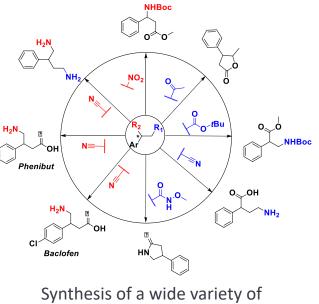
Significance

- The enantioenriched compounds produced by this method can be used to produce a variety of biologically active molecules and valuable synthetic intermediates.
- This novel methodology opens up the possibility for a wide range of new cooperative chemoenzymatic transformations for making bioproducts.

¹Litman et al. 2018. "Cooperative asymmetric reactions combining photocatalysis and enzymatic catalysis." **Nature**, 560, 355-359, https://doi.org/10.1038/s41586-018-0413-7.



Combination of photocatalytic isomerization and enzymatic reduction of alkenes



enantioenriched chemicals



