

Catalytic Photochemical Deracemization Reactions

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Photochemistry enables an access to reaction pathways that are not viable in conventional transformations. The talk will revolve around the conversion of a racemic mixture to a single enantiomer in a catalytic photochemical deracemization reaction.^{1,2} The entropically disfavored and thermally impossible process is driven by light energy. It allows to prepare enantiomerically pure (>90% *ee*) compounds, such as chiral allenes, olefins, cyclopropanes, and heterocyclic compounds, in a single operation. The reactions are catalyzed by a photocatalyst which either acts by energy transfer or by a reversible hydrogen atom transfer. Two recent examples are shown below.^{3,4}

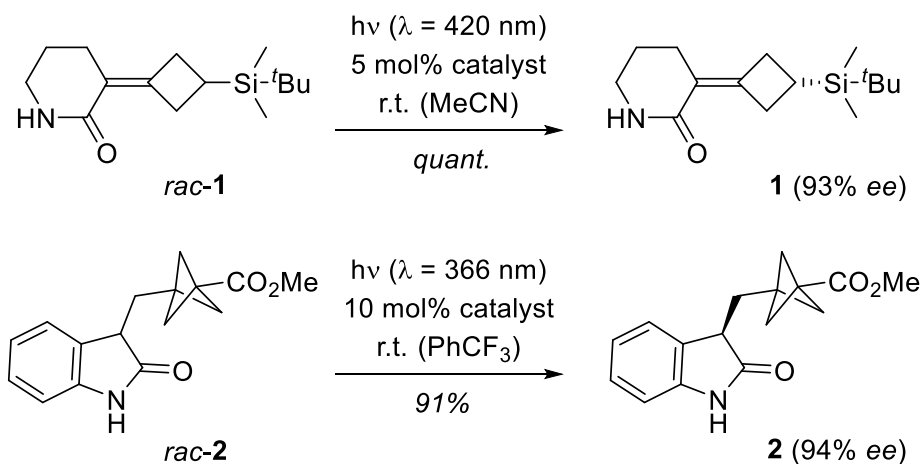


Figure 1. Photochemical deracemization of chiral olefin *rac-1* and of chiral oxindole *rac-2*.

1. First report: A. Hözl-Hobmeier, A. Bauer, A. V. Silva, S. M. Huber, C. Bannwarth, T. Bach; *Nature* **2018**, *564*, 240.
2. Review: J. Großkopf, T. Bach; *Angew. Chem. Int. Ed.* **2023**, *62*, e202308241.
3. T. Kratz, P. Steinbach, S. Breitenlechner, G. Storch, C. Bannwarth, T. Bach; *J. Am. Chem. Soc.* **2022**, *144*, 10133.
4. J. Großkopf, A. A. Heidecker, T. Bach; *Angew. Chem. Int. Ed.* **2023**, *62*, e202305274.