One-Pot Two-Step Sequential Photo-Biocatalytic Deracemization of *sec*-Alcohols Combining Photocatalytic Oxidation and Bioreduction

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Asymmetric synthesis of enantiomerically pure compounds constitutes one of the major pillars of the modern organic chemistry. In this context, stereocontrolled synthesis of non-racemic alcohols is critical for the production of varied high-value-added products such as pharmaceuticals, agrochemicals, flavours and fragrances [1].

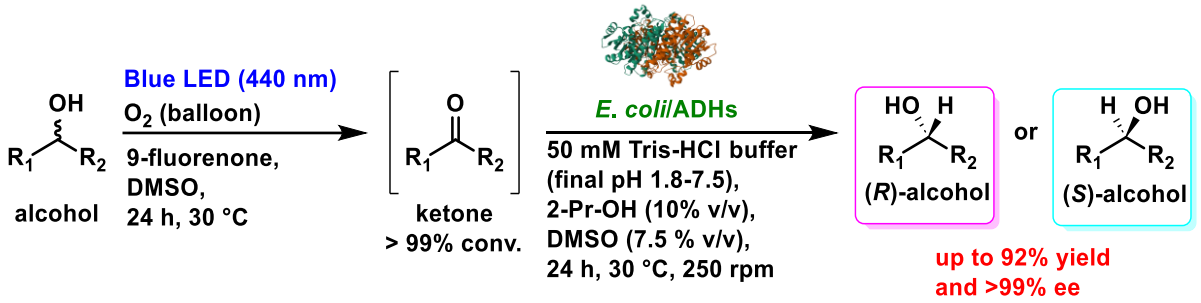

Figure 1. Photo-biocatalytic deracemization of racemic alcohols using 9-fluorenone-O_2-blue LED-*E.coli*/ADH system.

Herein, we report on the development of a one-pot, two-step sequential photo-biocatalytic cascade for the synthesis of enantioenriched alcohols (**Figure 1**) [2]. In order to quantitively oxidize a broad range of racemic (hetero)benzylic alcohols into prochiral ketones we employed a slightly modified protocol reported by Das et al. [3], which consisted of 9-fluorenone as a metal-free photocatalyst, molecular oxygen as the terminal oxidant, and DMSO as the hydrogen peroxide-neutralizing agent. The *in situ*-formed carbonyl intermediates were subsequently converted into optically pure alcohols using stereocomplementary recombinant alcohol dehydrogenases (ADHs) as biocatalysts. In conclusion, the elaborated linear telescopic cascade strategy allowed us to prepare pharmaceutically valuable chiral alcohols with excellent conversions (up to >99%) and enantiomeric excesses (up to >99%) in a stereocomplementary fashion.

References

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Acknowledgments

This research was funded by the National Science Center (NCN) of Poland grant "OPUS 24" (Grant No. 2022/47/B/ST4/00139). Statutory support by the Faculty of Chemistry at Warsaw University of Technology (WUT) is also acknowledged. The University of Graz and the Field of Excellence BioHealth are recognized for financial support. A.R. is grateful to the IDUB project ("Scholarship Plus" program for Ph.D. students) for providing a research fellowship.