

# Design, Syntheses, and Applications of Chiral Quaternary Ammonium Salt Catalysts

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Chiral quaternary ammonium salt catalysis is a powerful methodology to construct chiral (pharmaceutically relevant) target molecules with high levels of enantioselectivity under operationally simple conditions [1]. Our group has a longstanding interest in the design of new asymmetric ammonium salt catalysts and in the use of chiral ammonium salt catalysts for novel asymmetric transformations [2]. This lecture will give an overview about some of our most recent investigations in the field of catalyst design and on applications of such catalysts for the synthesis of chiral (biologically interesting) target molecules like  $\alpha$ -hydroxylated  $\beta$ -ketoesters or trifluoromethylated  $\alpha$ -amino acids or chiral  $\beta$ -amino acid derivatives.

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[1] Selected reviews: a) S. Shirakawa and K. Maruoka, *Angew. Chem. Int. Ed.* 2013, **52**, 4312; b) J. Tan and N. Yasuda, *Org. Process Res. Dev.* 2015, **19**, 1731.

[2] For three recent examples: J. Novacek, J. A. Izzo, M. J. Veticatt and M. Waser, *Chem. Eur. J.* 2016, **22**, 17339; b) V. Capaccio, K. Zielke, A. Eitzinger, A. Massa, L. Palombi, K. Faust and M. Waser, *Org. Chem. Front.* 2018, **5**, 3336; c) M. Winter, K. Faust, M. Himmelsbach, and M. Waser, *Org. Biomol. Chem.* accepted for publication.