Continuous-Flow Enantioselective Hydroacylations with Chiral Heterogeneous Rh Catalysts and Sequential-Flow Transformations

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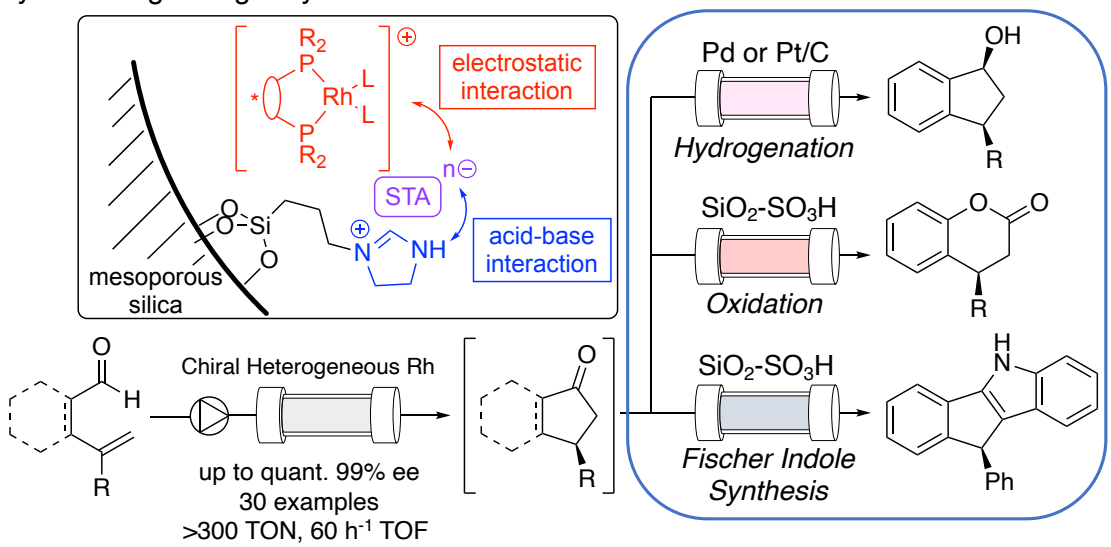
Transition metal-catalyzed enantioselective C−H bond functionalization has become an efficient method for synthesis of complex optically active molecules. However, heterogeneous catalysts for this chemistry have remained unexplored despite the advantages in easy catalyst separation and reuse. On the other hand, our group recently developed an efficient immobilization method of chiral metal catalysts using heteropoly acid/amine-functionalized SiO_2 composite and enantioselective flow reactions using chiral heterogeneous catalysts prepared by this approach.[1,2] Herein, we report the development of chiral heterogeneous Rh catalysts for continuous-flow enantioselective hydroacylations using this technique.

Heterogeneous catalysts were prepared by simply mixing supports and chiral Rh complexes[3], and prepared catalysts showed excellent activity to afford indanone derivatives in quantitative yield with 99% ee. It was found that the structure of amine on the surface of mesoporous SiO_2 had a significant effect on catalyst activity and selectivity. Under the optimized reaction conditions, >300 TON was achieved without leaching of Rh species. The catalysts demonstrate wide substrate scope, and sequential flow reactions combining with other heterogeneous catalyses for synthesizing biologically active molecules were realized.



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