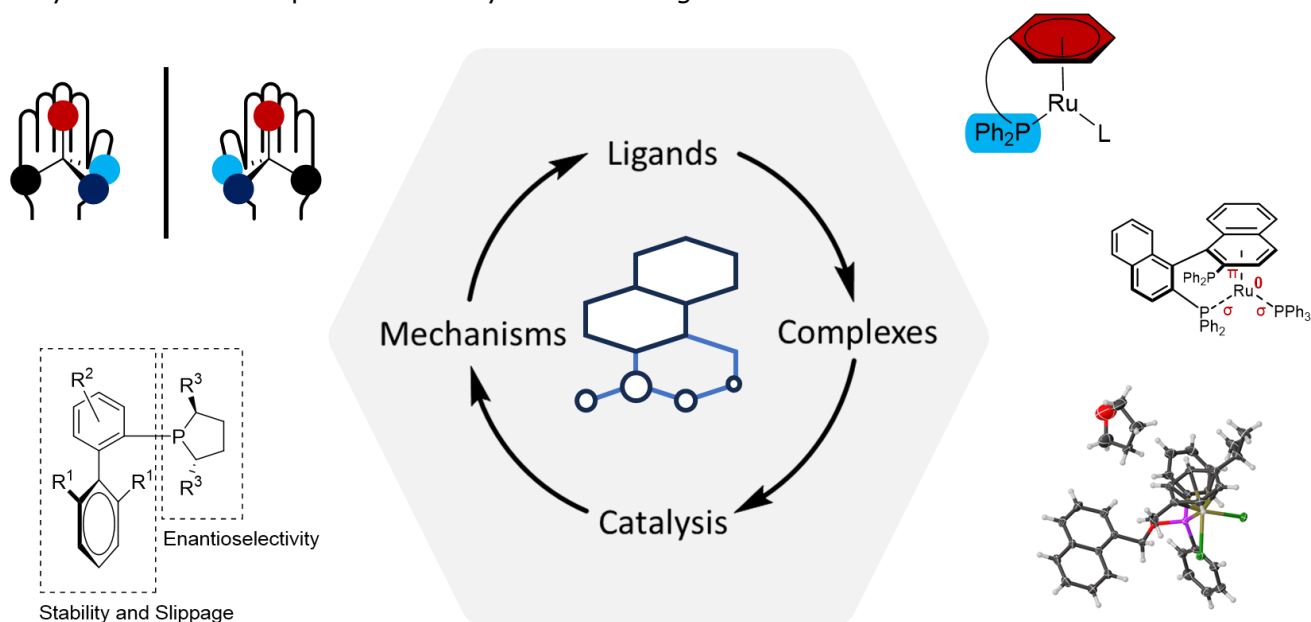


Group : Homogeneous Catalysis and Biomimetic Synthesis
Project : **Preparation of Phosphostereogenic Ligands for Ru(0) Complexes**
Supervisors : Kathleen Cheasty, Fedor Miloserdov

Keywords. Transition Metal Complexes, Homogeneous Catalysis

Introduction. Phosphines, one of the most prominent types of ligands in homogeneous metal catalysis, can easily be tuned in both their electronic as well as steric properties. In asymmetric catalysis, reaction selectivity is ultimately influenced by the chiral environment around the metal center created by the ligand.¹ To this end, several ligands bearing both axial, as well as P-chiral ligands have been developed.^{2,3}

Goal. We plan to investigate the synthetic routes to a stereogenic phosphine ligand (PhosL), as well as its subsequent coordination to Ru(II) and reduction to Ru(0). Next, the obtained complexes will be recrystallized and structural analysis will be performed using the single crystal XRD. The ability of obtained complexes to catalyze various organic transformations will be studied.



Topics to be studied. The project will combine organic synthesis of ligands, inorganic synthesis of ruthenium complexes and development of catalytic organic reactions.

Techniques to be used. This work will primarily involve techniques of organometallic chemistry, including operation under an inert atmosphere using Schlenk-line and/or glove box, monitoring reactions by TLC, NMR, and GC-MS techniques, isolation of air-sensitive products, crystallization, *X-Ray crystallography*, column chromatography, etc.

For students interested in this thesis project, the experience in a synthetic organic laboratory is a prerequisite.

Contact details. Fedor Miloserdov, room Helix 7026, email: fedor.miloserdov@wur.nl

References:

- (1) Rojo, P.; Riera, A.; Verdaguer, X. Bulky P-Stereogenic Ligands. A Success Story in Asymmetric Catalysis. *Coord. Chem. Rev.* **2023**, *489*, 215192. <https://doi.org/10.1016/j.ccr.2023.215192>.
- (2) Revés, M.; Ferrer, C.; León, T.; Doran, S.; Etayo, P.; Vidal-Ferran, A.; Riera, A.; Verdaguer, X. Primary and Secondary Aminophosphines as Novel P-Stereogenic Building Blocks for Ligand Synthesis. *Angew. Chem. Int. Ed.* **2010**, *49* (49), 9452–9455. <https://doi.org/10.1002/anie.201004041>.
- (3) Jang, Y.-S.; Woźniak, Ł.; Pedroni, J.; Cramer, N. Access to P- and Axially Chiral Biaryl Phosphine Oxides by Enantioselective CpxIrIII-Catalyzed C–H Arylations. *Angew. Chem. Int. Ed.* **2018**, *57* (39), 12901–12905. <https://doi.org/10.1002/anie.201807749>.

