

Remote Stereocontrol Through Distal Ionic Interactions-Directed Cross-Coupling

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Abstract: Catalytic construction of a chiral molecule relies on seamless communication between chirality of catalyst and prochirality of substrate. Spatial separation of a prostereogenic center from either the reaction sites or the prochirality-revealing groups (i.e., points of difference between geminal substituents) presents a universal hurdle in asymmetric catalysis. Here, we describe an enantioselective, catalytic transformation where both the enantiotopic reaction sites and the prochirality-revealing groups are distant from a prostereogenic quaternary carbon.¹ We addressed the challenges arising from the twofold spatial separations by innovating a unique anionic, axially chiral catalyst and developing a general strategy employing distal electrostatic interactions (Figure 1). This study demonstrates that, contrary to general expectation, it is viable to achieve precise long-range enantioinduction by engaging electrostatic interactions at a remote position, even as distant as 12 connecting atoms away from the reaction site. In addition, our recent studies demonstrates the adaptability of the ionic stereocontrol strategy in construction of axially chiral biaryls² and mechanically planar chiral rotaxanes.³

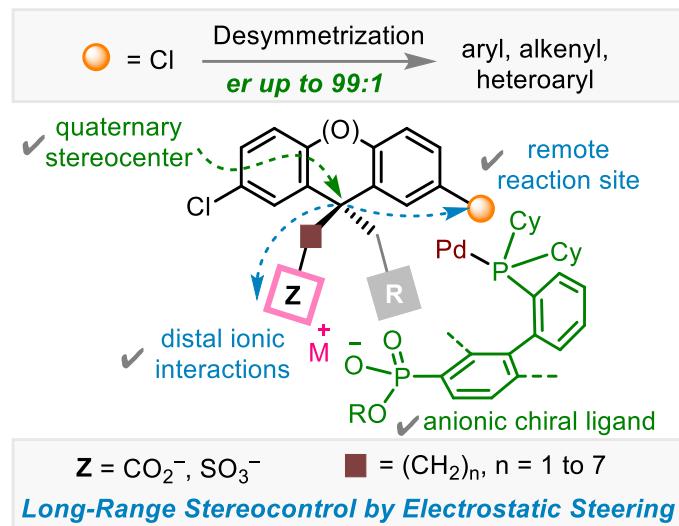


Figure 1. Distal Ionic Substrate–Catalyst Interactions Enable Long-Range Stereocontrol

References

1. Lou, Y.; Wei, J.; Li, M.; Zhu, Y. *J. Am. Chem. Soc.* **2022**, *144*, 123–129.
2. On, I. K. W.; Hong, W.; Zhu, Y. *Chem Catalysis* **2023**, *3*, 100523.
3. Li, M.; Chia, X. L.; Tian, C.; Zhu, Y. *Chem* **2022**, *8*, 2843–2855.