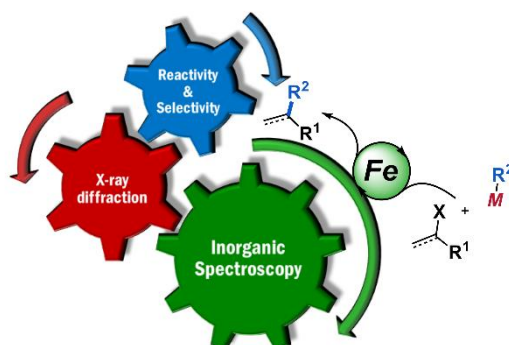


Down the Rabbit Hole: Illuminating the Organoiron Species Central to Organic Synthesis

Michael L Neidig

Department of Chemistry, University of Oxford, Oxford, United

Despite the success of iron-based catalysts for transformations in organic chemistry, including cross-coupling and C-H functionalisation reactions, a detailed molecular level understanding of these systems has remained elusive. This limitation is in stark contrast to palladium chemistry, where detailed studies of active catalyst structure and mechanism have provided the foundation for the continued design and development of catalysts with novel and/or improved catalytic performance. The use of an experimental approach combining advanced inorganic spectroscopies (Mössbauer, magnetic circular dichroism, electron paramagnetic resonance), density functional theory studies, synthesis and kinetic analyses enables the direct evaluation of the active iron species in iron-catalysed transformations in organic chemistry,^{1,2} providing a critical mechanistic framework to facilitate and inspire new iron-based methods development. This presentation will focus on our recent studies in organoiron intermediates, mechanism and methods development across reactions including C-H activation and cross-coupling.



References

- (1) Sears, J. D.; Neate, P. G. N.; Neidig, M. L. *J. Am. Chem. Soc.* **2018**, *140*, 11872-11883.
- (2) Neidig, M. L.; Carpenter, S. H.; Curran, D. J.; DeMuth, J. C.; Fleischauer, V. E.; Iannuzzi, T. E.; Neate, P. G. N.; Sears, J. D.; Wolford, N. J. *Acc. Chem. Res.* **2019**, *52*, 140-150.