A Modular Toolbox Based on Iridium, Rhodium and Amino Acids for Homogeneous Asymmetric Transfer Hydrogenation

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This talk will describe a modular approach to developing an extensive toolbox to construct homogeneous catalysts, especially for asymmetric transfer hydrogenation (ATH)- an important industrial process to carry out hydrogenation without molecular hydrogen. Beginning with rhodium or iridium, there are two scaffolds we have explored – Cp*R (Cp*R are tetramethylcyclopentadienyl rings with the fifth site being a group other than methyl) compounds with amino acids and N-heterocyclic carbene (NHC) complexes also with amino acids. In both scaffolds, the multiplicity of combinations (Cp*R variants and the many amino acids or NHC variants and the many amino acids) allow for the "tuning" of the catalyst to obtain optimum selectivity for specific substrates. Our lab has synthesized and screened hundreds of compounds and this talk will give details on the synthesis, characterization and catalytic activity of both sets of scaffolds. Single-crystal X-ray structures of many of the complexes will be described as a foundation to understanding catalytic selectivity.

Biography:

Joseph S. Merola is a Professor of Chemistry at Virginia Tech and a graduate of Carnegie-Mellon University (B.S. Chemistry, 1974). He received his Ph.D. in chemistry in 1978 from M.I.T under the direction of Professor Dietmar Seyferth. In 1978, he joined the Corporate Research Laboratories of Exxon Research and Engineering Co in New Jersey. In 1987, he joined Virginia Tech where he has been ever since, although he has held many different roles over his time there. Professor Merola is a Fellow of the American Chemical Society and a Fellow of the American Association for the Advancement of Science.