Iron(III)-Catalyzed Carbonyl-Olefin Metathesis and Oxygen Atom Transfer

The metathesis reaction between two unsaturated organic substrates is one of organic chemistry’s most powerful carbon-carbon bond forming reactions. The catalytic olefin-olefin metathesis reaction has led to profound developments in the synthesis of molecules relevant to the petroleum, materials and pharmaceutical industries. These reactions are characterized by their use of discrete metal alkylidene catalysts that operate by a well-established reaction mechanism. While the corresponding carbonyl-olefin metathesis reaction similarly enables the direct construction of carbon-carbon bonds, currently available methods are scarce and hampered by either harsh reaction conditions or the requirement of stoichiometric transition metal complexes as reagents. We have recently developed the first catalytic carbonyl-olefin ring-closing metathesis reaction that utilizes iron as an earth-abundant and environmentally benign transition metal.[1], [2] Our reaction design accommodates a variety of substrates and is distinguished by its operational simplicity, mild reaction conditions, high functional group tolerance, and amenability to gram scale synthesis.[3]

Iron(III)-Catalyzed Carbonyl-Olefin Metathesis:

