Strained Sandwich Compounds as Monomers for Metallopolymers: Syntheses, Structures, and Mechanisms

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Using metals in polymers requires synthetic methods to access so-called metallopolymers. One elegant method is the ring-opening polymerization of strained sandwich compounds, in particular, of [1]ferrocenophanes (Scheme 1). As this process works very well only for a limited number of bridging elements E, there is a need to improve existing monomers and expand the family of [1]ferrocenophanes suitable for controlled ring-opening polymerization.

In this seminar, some of the main results from my research group will be presented and put into the context of other researchers’ results. I will discuss the development of a family of group-13-bridged [1]ferrocenophanes, from our first results with aluminum- and gallium-bridged species to our most recent exploration of highly strained sandwich compounds with boron in bridging position. An important part of our chemistry is concerned with tuning of steric requirements of reagents. In this context, we synthesized a family of chiral ferrocene derivatives that we employ as reagents for the synthesis of [1]ferrocenophanes (Figure 1). These chiral precursors were synthesized through a multistep procedure in enantiomerically pure form and allowed us to prepare a family of chiral [1]ferrocenophanes. In addition to the syntheses and structures of [1]ferrocenophanes, investigations of ring-opening polymerization and reaction mechanisms will be discussed.