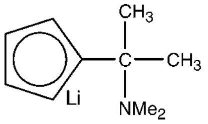
ORGANOMETALLICS

Volume 27, Number 1, January 14, 2008

Editor's Page

Introduction to the Review by Erker, Kehr, and Fröhlich in This Issue of *Organometallics*

To most of our readers, the senior author of the review in this issue of *Organometallics*, Professor Gerhard Erker of the University of Münster in Germany, is well-known for his outstanding, original research in the area of organotitanium and -zirconium chemistry. In the present review, however, he and his coauthors have changed their focus to organoalkali metal chemistry. The cover figure shows an example of the functional alkali metal cyclopentadienides that are the subject of their review: two recurring units of the oligomeric chain of the $Li[C_5H_4C(CH_3)_2N(CH_3)_2]$ reagent, **1**. In the oligomer, the dimethylamino donor group is strongly involved in the formation of the framework by its coordination to the central lithium cation. At the same time, the lithium cation is weakly coordinated to the cyclopentadienyl ring of the same subunit and strongly η^5-coordinated to the opposite face of the cyclopentadienyl ring of the next identical monomeric [CpR]Li subunit. The oligomeric "head-to-tail" structure of 1 in the solid state was reported by Kotov, Fröhlich, and Erker in 2003 (J. Organomet. Chem., 2003, *676*, 1–7). This and many other functionally substituted lithium cyclopentadienides are described in this review. They were prepared either by the addition of lithium cyclopentadienide to carbonyl-containing substrates or by fulvene routes (as was **1**).



1

A large part of the review deals with the interesting structural chemistry of the organofunctional alkali metal cyclopentadienides prepared in this study. Depending on the presence or absence of external Lewis base molecules such as diethyl ether or tetramethylethylenediamine, and on the nature of Lewis base sites in the substituents on the cyclopentadienyl rings, monomeric, dimeric, oligomeric, or polymeric solid state structures were encountered. The structures can become rather complicated as a result of the bonding ability of the lithium ions, as seen, for example, in the oligomeric structure of **1** in the solid state. [Note that throughout the review, the lithium cation and the cyclopentadienide anion are drawn without their charges, for ease of drawing and to make the formulas less "busy".]

The purpose of this novel alkali metal cyclopentadienide chemistry was to develop reagents that would be useful in widening the scope of Professor Erker's very active program in group 4 organometallic chemistry, and the review brings examples of the applications of **1** and the many other functionally substituted lithium cyclopentadienides in the synthesis of titanium and zirconium bent metallocenes and related "constrained geometry" systems used as components in homogeneous Ziegler–Natta olefin polymerization. We can look forward to much interesting new chemistry and to important new applications in synthesis and catalysis as Professor Erker and his coworkers expand the scope of this promising area of research.

Professor Erker studied chemistry first at the University of Köln, then at the University of Bochum in Germany. There he obtained his *Dr. rer. nat.* in 1973, carrying out his dissertation research on the chemistry of diradicals under the guidance of Professor Wolfgang R. Roth. After a postdoctoral year with Professor Maitland Jones at Princeton University, he returned to Bochum, where in 1981 he completed his Habilitation, during the course of which he began his studies in organometallic chemistry, which included the synthesis of butadiene−zirconocene complexes. Supported by a prestigious Heisenberg Fellowship, he spent 1984–1985 at the Max Planck Institut für Kohlenforschung in Mülheim, where he became further immersed in organometallic chemistry. A five-year stay at the University of Würzburg as Associate (C-3) Professor followed, and in 1990 he was appointed to his present position of Professor of Chemistry at the University of Münster.

10.1021/om7011166 CCC: $40.75 © 2008 American Chemical Society
Publication on Web 12/20/2007

Professor Erker has been one of the main contributors in Germany to transition metal organometallic chemistry and catalysis during the past 20-plus years. He and his co-workers have carried out studies concerning aryne group 4 metallocene chemistry, the formation and unique reactivity of cyclodi- and cyclotrimeric formaldehyde zirconocenes, the very interesting chemistry of butadiene—zirconocenes, and some innovative phosphorus ylide/metallocene chemistry. Since joining the University of Münster, he has published a considerable number of synthetic and mechanistic papers on the catalysis of homogeneous Ziegler–Natta polymerization, including reports on the development of important new catalysts. It was from this work that the chemistry covered in the present review, ultimately directed toward the development of new and useful organofunctional group 4 metallocenes and related systems, developed. Taken together, this large body of original and innovative research represents an outstanding contribution to modern organometallic chemistry.

Recent and present work in Professor Erker's laboratories focuses on aspects of bio-organometallic chemistry and on the development of systems for the selective activation and the use of molecular hydrogen.

Gerald Kehr, after carrying out postdoctoral research in Professor Erker's group, is now a permanent staff member in the Institute of Organic Chemistry at Münster, whose duties include, *inter alia*, state of the art NMR analyses. He obtained his doctoral degree at the University of Bayreuth, carrying out research under the guidance of Professor Bernd Wrackmeyer. Dr. Roland Fröhlich joined the Instutute of Organic Chemistry at Münster as Staff Crystallographer in 1993 after 10 years with the Enraf Nonius Company. He obtained his doctorate at the University of Köln in 1982 and carried out postdoctoral studies at Münster with Professors Hans Wondratschek and Bernt Krebs.

The cover figure was kindly generated by Professor Arnold L. Rheingold.

Dietmar Seyferth
Editor

OM7011166