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Topics in Organometallic Chemistry

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Topics in Organometallic Chemistry

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Lanthanides: Chemistry and Use in Organic Synthesis

Volume Editor: S. Kobayashi

With contributions by

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The series *Topics in Organometallic Chemistry* presents critical overviews of research results in organometallic chemistry, where new developments are having a significant influence on such diverse areas as organic synthesis, pharmaceutical research, biology, polymer research and materials science. Thus the scope of coverage includes a broad range of topics of pure and applied organometallic chemistry. Coverage is designed for a broad academic and industrial scientific readership starting at the graduate level, who want to be informed about new developments of progress and trends in this increasingly interdisciplinary field. Where appropriate, theoretical and mechanistic aspects are included in order to help the reader understand the underlying principles involved.

The individual volumes are thematic and the contributions are invited by the volumes editors.

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Preface

While the lanthanides (strictly defined as the 14 elements following lanthanum in the periodic table, but as normally used also include lanthanum itself) have several unique characteristics compared to other elements, their appearance in the history of the development of organometallic chemistry is rather recent. Since the f orbitals are filled gradually from lanthanum ($[\text{Xe}]4f^0$) to lutetium ($[\text{Xe}]4f^{14}$), they are regarded as the f-block elements, which are discriminated from the d-block transition elements.

This book was edited as the second volume of “Topics in Organometallic Chemistry”, aiming at an overview of recent advances of chemistry and organic synthesis of lanthanides. Since scandium (Sc) and yttrium (Y) (which lie above the lanthanides and have similar characteristics) are also included, this book covers rare earth chemistry. Recently, especially in this decade, the chemistry and organic synthesis of lanthanides have developed rapidly as one of the most exciting areas. An international team of authors has been brought together in order to provide a timely and concise review of current research efforts such as lanthanide catalysis in small molecule organic synthesis especially focused on carbon-carbon bond-forming reactions, chemistry and organic synthesis using low-valent lanthanides such as diiodosamarium, asymmetric catalysis, lanthanide-catalyzed polymer synthesis, and polymer-supported lanthanide catalysts used in organic synthesis. Principles of organolanthanide chemistry are summarized in the first chapter. I am sincerely grateful to Drs. R. Anwender, E. C. Dowdy, H. Gröger, Z. Hou, H. Kagan, G. Molander, J. L. Namy, M. Shibasaki, Y. Wakatsuki, and H. Yasuda for participating in this volume. J. Richmond, J. Sterritt-Brunner, and B. Benner (Springer) are also acknowledged for encouraging me to organize this work.

Finally, I hope that this volume is helpful to many researchers and students who are or will be involved in or interested in this truly exciting and hot field.

Tokyo, December 1998

Shū Kobayashi

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