Series Preface

The success of the *Encyclopedia of Inorganic Chemistry* (EIC), pioneered by Bruce King, the founding editor-in-chief, led to the 2012 integration of articles from the *Handbook of Metalloproteins* to create the newly launched *Encyclopedia of Inorganic and Bioinorganic Chemistry* (EIBC). This has been accompanied by a significant expansion of our Editorial Advisory Board with international representation in all areas of inorganic chemistry. It was under Bruce's successor, Bob Crabtree, that it was recognized that not everyone would necessarily need access to the full extent of EIBC. All EIBC articles are online and are searchable, but we still recognized value in more concise thematic volumes targeted to a specific area of interest. This idea encouraged us to produce a series of EIC (now EIBC) books, focusing on topics of current interest. These will continue to appear on an approximately annual basis and will feature the leading scholars in their fields, often being guest coedited by one of these leaders. Like the *Encyclopedia*, we hope that EIBC books continue to provide both the starting research student and the confirmed research worker a critical distillation of the leading concepts and provide a structured entry into the fields covered.

The EIBC books are referred to as ''spin-on'' books, recognizing that all the articles in these thematic volumes are destined to become part of the online content of EIBC, usually forming a new category of articles in the EIBC topical structure. We find that this provides multiple routes to find the latest summaries of current research.

I fully recognize that this latest transformation of EIBC is built upon the efforts of my predecessors, Bruce King and Bob Crabtree, my fellow editors, as well as the Wiley personnel, and, most particularly, the numerous authors of EIBC articles. It is the dedication and commitment of all these people that is responsible for the creation and production of this series and the ''parent'' EIBC.

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September 2013

Volume Preface

Our understanding of metals and other trace elements in cells has witnessed an explosion over recent years. This has been prompted by a combination of new methods to probe intracellular metal locations and the dynamics of metal movement in cells, high-resolution detection of metal–biomolecule interactions, and the revolution of genomic, proteomic, metabolic, and even ''metallomic'' approaches to the study of inorganic physiology. Environmental metals and metalloids, including iron, copper, zinc, cobalt, molybdenum, selenium, and manganese, are all accumulated by cells and organisms in the micro- to millimolar range. Yet despite this abundant sea of diverse metals, only the correct metal cofactor is matched with a partner metalloprotein—mistakes in metal ion biology rarely occur. At the same time, free metal ions can be detrimental to cellular components and processes, so systems have evolved to control carefully the trace element concentrations and locations (homeostasis). The mechanisms underlying this ''perfect'' handling of metals are the goal of studies of the cell biology of metals.

Metals in Cells covers topics describing recent advances made by top researchers in the field including: regulated metal ion uptake and trafficking, sensing of metals within cells and across tissues, and identification of the vast array of cellular factors designed to orchestrate assembly of metal cofactor sites while minimizing toxic side reactions of metals. In addition, it features the aspects of metals in disease, including the role of metals in neurodegeneration, liver disease, and inflammation, as a way to highlight the detrimental effects of mishandling of metal trafficking and response to ''foreign'' metals.

While it is not possible to provide a comprehensive treatment of transport, homeostasis, sensing, and regulation of the entire ''biological periodic table,'' what *Metals in Cells* does, is give a broad sampling of the current knowledge and research frontiers in these areas. The reader will get a sense of some of the general principles of biological response to trace elements, but will also marvel at the disparate evolutionary responses of different organisms to a variable and changing inorganic environment. One of the ultimate goals in this area is to find the principles of inorganic chemistry in the biological responses.

Metals in Cells also gives an up-to-date description of many of the current tools being used to study inorganic cell biology. Genetics and biochemistry are combining with more recent genomic, proteomic, and metallomic approaches. Increasingly sophisticated microscopy and imaging technologies provide information about dynamic distribution of inorganic elements in cells and subcellular compartments. There is yet more room for improvement by collaborative approaches among physicists, chemists, and biologists.

With the breadth of our recently acquired understanding of inorganic cell biology, we believe that *Metals in Cells*, featuring key aspects of cellular handling of inorganic elements, is both timely and important. At this point in our progress, it is worthwhile to step back and take an expansive view of how far our understanding has come, while also highlighting how much we still do not know.

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September 2013