

Preface

“Coordination space” is a new chemical term invented recently in Japan. This new concept was the inspiration for a 4-year project entitled the “Chemistry of Coordination Space,” which was begun on September 2004 and funded by a Grant-in-Aid for Scientific Research on a Priority Area from MEXT, Japan. The project is headed by Professor Susumu Kitagawa of Kyoto University, and involves more than 100 researchers. In this project, the term “coordination space” is defined simply as a space that utilizes coordination compounds and/or reactions. The coordination space affords a unique spatial stage, where molecules and/or ions perform chemical or physical actions in peculiar conditions characteristic of the nanometer-sized world, and the project aims at opening up a new dimension of nanoscience by creating such a space. The members in the project aim to explore and discover new phenomena of confined molecules and the ions therein, and on this basis, to develop novel molecule-assembling, -stressing and -converting fields. Thus, the research has been carried out along the following four lines: (1) synthesis of new nanoporous coordination compounds for comprehensive clarification of the intermolecular interactions in molecule-assembling and -stressing fields; (2) control of potentials for providing novel charge-transfer fields; (3) preparation of a dynamic nanospace based on hybridization of biomolecules and coordination compounds; and (4) examination of the interplay among electrons, ions, and molecules with the goal of creating a energy storage field. In addition to individual and collaborative research activities, meetings and symposia have frequently been held to discuss the present and future activities in this new area. In particular, international meetings sponsored by the project, such as the First, Second, and Third International Symposia on Chemistry of Coordination Space (held in Japan in 2005, 2006, and 2007), the Japan–UK Joint Symposium on Chemistry of Coordination Space (London Imperial College, 2006), and the Japan–USA Joint Symposium on Chemistry of Coordination Space (Northwestern University, 2007) have provided important opportunities to discuss the new science and technology of coordination space with leading scientists in other countries.

In this special issue we bring together the various review articles on research activities on the coordination space being developed in Japan. Recent advances in the synthesis and gas-adsorbing functions of nanoporous coordination polymers, ionic crystals, and surface-functionalized mesoporous materials are discussed by S. Kitagawa and R. Matsuda, S. Uchida and N. Mizuno, T. Akutagawa and T. Nakamura, and K. Ariga et al., with respect to structural analyses related to the coordination space are discussed by Y. Kubota et al., and M. Kawano and M. Fujita, and the theoretical analyses are reviewed by M. Nagaoka et al. Coordination space studies related to artificial metalloproteins, diporphyrin assemblies, and bio-inspired materials such as artificial DNAs are the focus of Y. Watanabe et al., A. Osuka et al., and K. Tanaka and M. Shionoya. 2D and 3D assemblies of metal complexes with electro- and photo-functionalities and catalytic activities are reviewed by M. Haga et al., H. Nishihara et al., and M. Tada and Y. Iwasawa. The different types of coordination space chemistry applying to magnetic metal complexes are described by H. Oshio et al., H. Miyasaka et al., and N. Kojima et al. Photochemical hydrogen evolution in the coordination space is described by K. Sakai and H. Ozawa.

The project on coordination space will end in March 2008. However, we believe that this project is just the beginning of a new field of coordination chemistry, which will be developed by linking the coordination space to various other chemistry fields, as well as to the fields of physics, biology, and material science in research centers across the world. Last but not least, I would like to express thanks to Professor A.B.P. Lever for his kind suggestions and subsequent organization of this issue.

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