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Shunichi Fukuzumi · Hideki Kandori
Yoshio Aso *Editors*

Chemical Science of π -Electron Systems

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 Springer

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Preface

The versatility and wide potential of π -electron-based molecules, as typified by fullerenes and porphyrins, have continued to provide unique and sometimes unexpected properties and functions being continuously discovered and utilized in functional devices. In order to facilitate the investigation on highly elaborated π -spaces with more sophisticated and complex orders and functionality, a research project entitled “Emergence of Highly Elaborated π -Space and Its Function” has been launched as a Grant-in-Aid for Scientific Research on Innovative Areas (2008–2012) by The Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT). In this joint project, highly elaborated π -spaces are defined as highly complex orders/systems that stem from the π -electron-based interactions. Cutting-edge research has been performed based on clearly defined strategic objectives as well as an emergent approach that comes from innovation of unpredicted discovery. The research project consists of four groups (A01–04). The research group A01 led by Prof. Takeshi Akasaka has constructed novel π -electron systems of nonplanarity including metal-endofullerenes, whereas the research group A02 led by Prof. Atsuhiko Osuka has developed highly elaborated π -space functionality through the assembly of π -electron-based molecules. Based on new types of π -electron-based molecules and assemblies, the revolutionary functions have been explored by clarifying the electronic, optical, and magnetic interactions of the highly elaborated π -spaces in research group A03 led by Prof. Shunichi Fukuzumi. Research group A04 led by Prof. Hideki Kandori has studied the interactions between biological molecules with highly elaborated π -space to discover new phenomena and create new concepts in biology.

This book is composed of eight parts. Part I: Extension of Planar π -Electron Systems, Part II: Curved π -Electron Systems, Part III: Porphyrinoids, Part IV: Open-Shell π -Electron Systems, Part V: Heteroatom-Conjugated π -Electron Systems, Part VI: Supramolecular Chemistry of π -Electron systems, Part VII: Innovative Function of π -Electron Systems, and Part VIII: π -Electron Systems in Biosystems and Biomimetics. It summarizes cutting-edge research in the MEXT project of

“Emergence of Highly Elaborated π -Space and Its Function”, covering the research area of A01–A04 and also interdisciplinary fields created by intensive collaborations between the different research groups to provide the current status and future perspective of highly elaborated π -spaces with high orders and functionality.

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Part I

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