Edited by Qiang Xu

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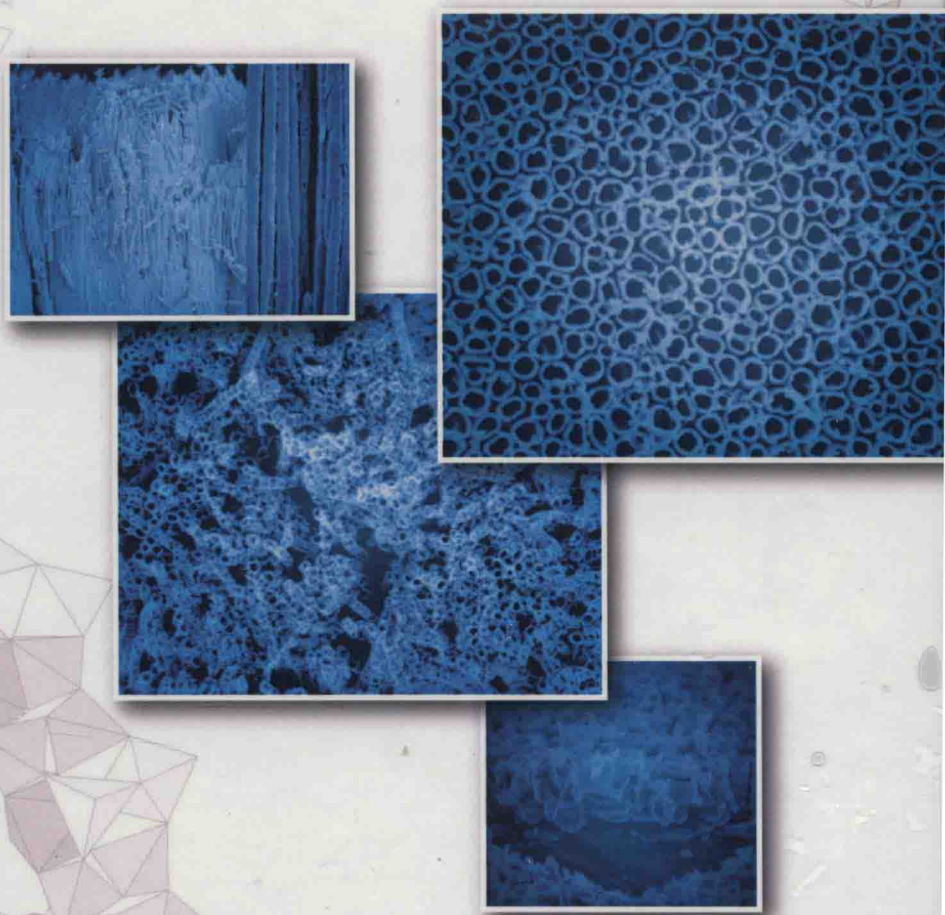
NANOPOROUS MATERIALS

Synthesis and Applications



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Synthesis and Applications

Preface

In the past two decades, the field of nanoporous materials has undergone accelerated developments. As these materials possess high specific surface areas, well-defined pore sizes, and functional sites, they show a very broad range of highly potential applications. To demonstrate the profound progress and provide a comprehensive recognition of nanoporous materials for researchers in this promising field, it is my honor, as an organizer, to invite leading scientists in this field to survey the key developments of nanoporous materials in a broad range and important advances in their applications to date, which are outlined in the chapters of this book.

The chapters start with new soft porous materials. In Chapter 1, Weber and Thomas give an overview of the synthetic approaches and applications of a variety of meso- and microporous polymers and organic frameworks, and in Chapter 2, Jiang and coworkers provide a review on conjugated microporous polymers by focusing on the design and synthesis along with the function exploration of this new class of organic porous materials. In Chapter 3, Jiang and I introduce the synthesis and potential applications of nanoporous metal–organic frameworks. In Chapter 4, Nishiyama and Tanaka present how to prepare mesoporous carbons by a soft-templating method and their applications for supercapacitors and membrane separations. Chen and coworkers review the synthesis of nanoporous metals and alloys by a dealloying method and their broad applications in Chapter 5, and Yamauchi and coworkers describe the synthesis of mesoporous metals and metal oxides by soft- and hard-templating methods in Chapter 6. In Chapter 7, Caruso and coworkers highlight the fabrication of nanoporous semiconductor materials that are used for photocatalysis. As has been extensively investigated thus far, three chapters deal with porous silica materials. Wu and coworkers present the structural modification and functional improvement of layered zeolites in Chapter 8, Fujiwara addresses the application of mesoporous silica in acid catalysis and drug delivery in Chapter 9, and Yazawa demonstrates the formation and the application of glass with nanopores in Chapter 10. Finally, in Chapter 11, Inge and Zou document the constructions and interesting properties of germanates and related materials with open frameworks.

It is obvious that the accomplishments in nanoporous materials to date are exciting and the potential appears to be even greater. I am sure that the nanoporous materials field will maintain a sustained growth in the future.

I would like to deeply thank all the authors for their excellent contributions to this book as well as to this field. Sincere thanks to Mr. Lance Wobus and Ms. Amy Blalock (Taylor & Francis/CRC Press) for their conscientious cooperation and to Drs. Bo Liu, Hai-Long Jiang, and Di-Chang Zhong (AIST) for their valuable assistance in the editorial process.

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Editor

Qiang Xu was born in China. He received his PhD degree in physical chemistry in 1994 from Osaka University, Japan. After working as a postdoctoral fellow at Osaka University for a year, he started his career as a research scientist at the Osaka National Research Institute in 1995. Currently, he is a senior research scientist at the National Institute of Advanced Industrial Science and Technology (AIST) and an adjunct professor at Kobe University, Japan. He received the Thomson Reuters Research Front Award in 2012. His research interests include porous materials and nanostructured materials and related functional applications.

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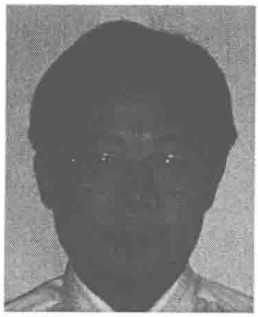

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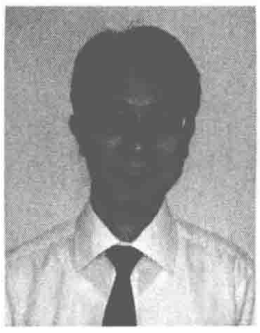

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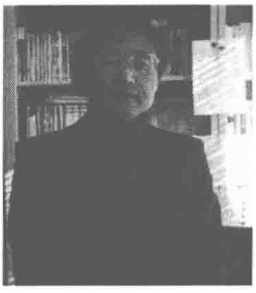

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