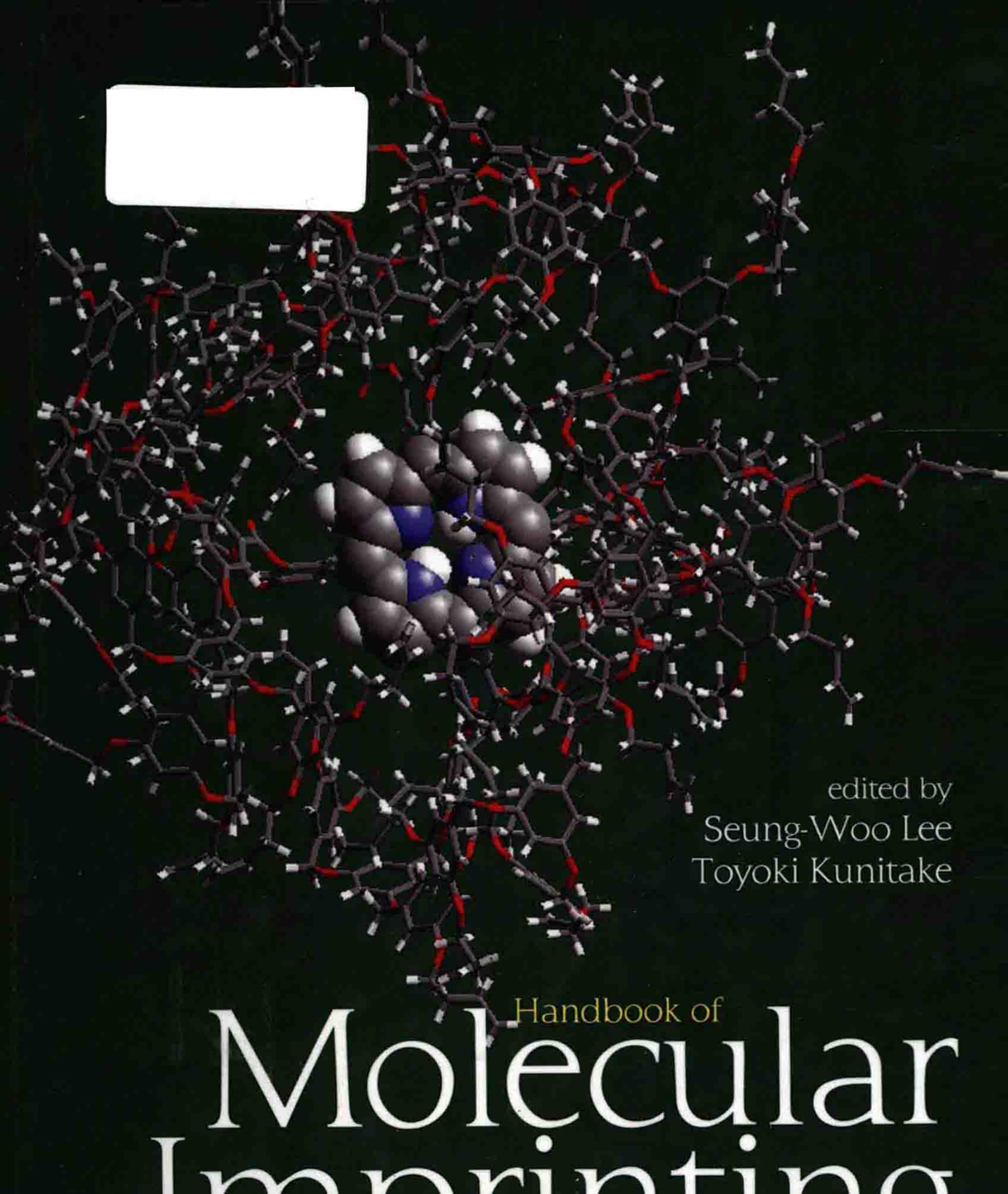

edited by
Seung-Woo Lee
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PAN STANFORD PUBLISHING

Published by

Pan Stanford Publishing Pte. Ltd.
Penthouse Level, Suntec Tower 3
8 Temasek Boulevard
Singapore 038988

Email: editorial@panstanford.com
Web: www.panstanford.com

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library.

Handbook of Molecular Imprinting: Advanced Sensor Applications

ISBN 978-981-4316-65-1 (Hardcover)
ISBN 978-981-4364-32-4 (eBook)

Printed in the USA

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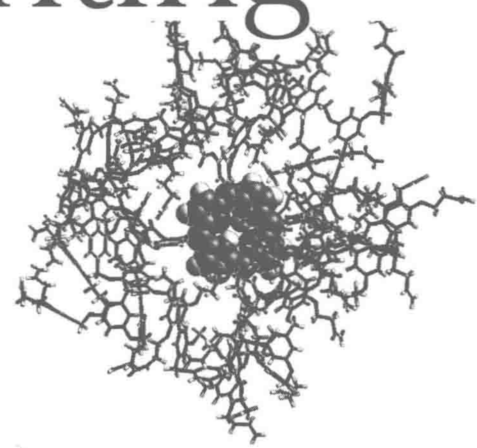

Preface

Molecular imprinting is now established as an indispensable tool for separation and sensor technologies. The most popular scheme to realize the molecular imprinting concept is probably the cross-linking of linear polymers in the presence of template molecules. Three-dimensional cavities would be created in the polymer network after the removal of template molecules. Unfortunately, the conformational adaptability of linear polymers is limited, and template molecules and the surrounding polymer chains cannot produce best molecular fitting in most cases. Molecular fitting by commonly employed imprinting materials is less than satisfactory compared with polypeptide chains of protein molecules. Superior three-dimensional fit of active sites of enzyme molecules and their specific substrates are truly remarkable.

Some of the inorganic chains are much more flexible than organic chains. For example, rotational and bending motions of metal–oxygen bonds are more facile than those of carbon–carbon bonds. This fact implies that metal oxide gels provide better molecular fitting with template molecules. In fact, the first example of molecular imprinting was reported in 1931 for silica matrix, as mentioned in Chapter 1. The use of inorganic matrices became much expanded in recent years and now occupies a significant fraction of molecular imprinting studies.

This handbook reflects this situation and attempts to survey the recent advances of molecular imprinting in inorganic and organic matrices in a combined form. The functional aspect is more or less focused on sensor applications. Such applications have become increasingly important in relation to environmental and biomedical issues, as summarized as Parts 3 and 4, respectively. The discussion in Chapter 1 will help grasp the pros and cons of inorganic matrices relative to organic matrices, and Part 5 provides a patent-based market analysis of molecular imprinting technology.

We are grateful to Mr. Stanford Chong of Pan Stanford Publishing for his continuous encouragement during the preparation of this handbook. Many thanks also to our wives, who showed splendid perseverance towards the absent (minded) husbands.

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