

Current Trends of Surface Science and Catalysis

Jeong Young Park
Editor

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 Springer

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Daejeon, Republic of Korea

ISBN 978-1-4614-8741-8

ISBN 978-1-4614-8742-5 (eBook)

DOI 10.1007/978-1-4614-8742-5

Springer New York Heidelberg Dordrecht London

Library of Congress Control Number: 2013949285

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Printed on acid-free paper

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Preface

The global energy and environmental crises have become essential issues for mankind, driving rapid developments in interface chemistry for nanocatalysts. Production of only one desired molecule that may be used as a fuel or chemical out of several thermodynamically possible molecules is called catalytic selectivity and is the foundation of “green chemistry.” For this goal, bridging materials and pressure gaps to meet the needs of industry is a major challenge.

Surface science has been combined with nanoscience, leading to the development of novel functional materials, and new catalysts and energy conversion devices. Surface science has evolved such that new instruments for surface analysis on the molecular scale could be used in a vacuum or at realistic conditions (e.g., at high pressures and at solid–liquid interfaces where chemical processes typically occur), which has led to new physical and chemical concepts at working conditions. Overall, the materials and techniques of modern surface science may bring the breakthroughs for solving the global energy and environmental problems that the world is facing.

This book, entitled “Current Trends of Surface Science and Catalysis,” presents new strategies and paradigms in the development of new materials and techniques. We will discuss various architectures of model catalytic systems, including colloid nanoparticles with controlled size, shape, and composition. Noncolloidal nanocatalysts and their application will be outlined. New in situ surface techniques to bridge pressure gaps will be discussed as well. The influence of surface oxides and metal–oxide interfaces in heterogeneous catalysis and surface chemistry will be shown. The broad range of topics included in this volume share perspectives from surface science for research of nanocatalysts, renewable energy conversion, biointerface, electrochemistry, and environmental science.

I would like to express my sincere appreciation to all of the authors who contributed to this exciting project, revealing the depth and breadth of this field.

Daejeon, Republic of Korea

Jeong Young Park

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