

Nanostructured Catalysts

This book, the 19th volume in the RSC Nanoscience and Nanotechnology series, is focussed on heterogeneous catalysts for selective oxidation reactions and their atomic-scale structure, both in the bulk and at the surface. It should be noted that nanostructured catalysts do not constitute a new area of application—only the terminology is new. The book deals with syntheses, the characterization of the solid state, applications, mechanisms, and the structure–activity relationships of different surfaces in selective oxidation reactions, with the corresponding reactants, intermediates, and products. This is a key strength of the book—the emphasis throughout is on applications.

Catalysis is a branch of technical chemistry. In all its aspects it is also undoubtedly one of the key technologies of the new millennium. Although the understanding of the fundamentals of catalysis has progressed to a mature level, nowadays catalysis research focuses on various current topics, such as changes of feedstock, process intensification, improving selectivity, etc. In these areas of research, the catalyst itself naturally occupies a central position. In this respect the book provides an excellent selection of the latest insights and perspectives about the course of chemical reactions, concentrating on the example of selective oxidations at nanostructured solid surfaces.

Catalysts are present in all areas of the chemical industry. Heterogeneous solids occupy the uppermost commanding position in this context; they accelerate a very wide variety of reactions. The book focuses mainly on selective oxidations; this is a worthwhile task, because intensive research on reactant structure–activity relationships in selective oxidations has only been carried out in the last 20–30 years, in contrast to, for example, hydrogenation reactions that have been thoroughly explored over a much longer period. The research described here is leading to new discoveries in the field of surface morphology at atomic resolution level, which will certainly help in gaining a deeper understanding of these complex processes.

The content of the book appears at first somewhat heterogeneous. The first chapters are grouped thematically, but the later contributions stand alone with no clear pattern. Nevertheless, the contents list affords reasonably easy access to the various topics, and the short preface helps in understanding the organization of the book and the choice of exam-

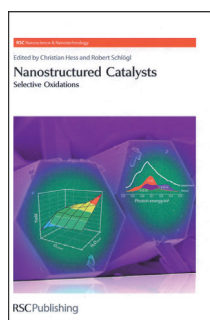
ples. After a brief introduction, the activation of methane and other alkanes in selective oxidations is discussed in detail with various examples including the selective oxidation of propane to acrylic acid. The same chapter describes the synthesis of acrylonitrile by selective oxidation of propylene or propane in the presence of ammonia. Both chapters report extensively on the synthesis and structure of Mo–V–Te–Nb oxide phases and their catalytic activity. In addition, several chapters are devoted to mild selective oxidations over gold nanoparticles, epoxidations of olefins on gold and silver surfaces, and oxidative dehydrogenations. In the last chapter, which is devoted to some process technological aspects of the selective oxidation reactions mentioned above, insufficient space is given to new developments, whereas some material of a textbook kind is repeated. Here I would have liked to find more detailed information about innovative reactor concepts such as short-term and wall reactors; even the discussion of the membrane and microstructured reactors that are mentioned elsewhere in the book does not give enough detailed information. In this chapter, it would have been useful to include a short report about the first steps in an industrial up-scaling of new or improved selective oxidations, e.g., the manufacture of acrylonitrile from propane. The application examples are accompanied by many schemes, tables, spectra, and other characterization results, which break up the otherwise dense text of the contributions. However, it must be noted that the quality of the images (e.g., in the TEM micrographs) is unsatisfactory in many cases.

The book is neither a general introduction to heterogeneous catalytic selective oxidations nor an easily readable book for those with a broad interest in the subject. It is not suitable for beginners and students, but is intended for postgraduate students, post-docs, and scientists whose work is focused on heterogeneously catalyzed selective oxidations, especially for those engaged in the forward-looking research fields mentioned above. *Nanostructured Catalysts: Selective Oxidations* provides a good summary of current research and the methods used, aimed at a deeper understanding of the elementary steps of selective oxidations. The book can be strongly recommended for every scientist who is concerned with heterogeneous catalytic selective oxidations.

Andreas Martin

Leibniz-Institut für Katalyse e.V. an der
Universität Rostock (Germany)

DOI: 10.1002/anie.201200132



Nanostructured Catalysts
Selective Oxidations. Edited
by Christian Hess and Robert Schlögl. RSC Pub-
lishing, Cambridge, 2011.
452 pp., hardcover,
£ 144.99.—ISBN 978-
1854041862