



STRUCTURAL SCIENCE  
CRYSTAL ENGINEERING  
MATERIALS

ISSN 2052-5206

## 50 Years of Materials Science in Singapore. Edited by Freddy Boey, B. V. R. Chowdari and Subbu S. Venkatraman. World Scientific, 2016. Pp. 244. Price GBP 23.00 (ISBN 978-981-3147-55-3, softcover), GBP 48.00 (ISBN 978-981-4730-69-3 hardcover)

Cristiano Ferraris\*

Laboratoire de Minéralogie – USM0201, Muséum National d'Histoire Naturelle, 61 rue Buffon, 75005 Paris, France.

\*Correspondence e-mail: ferraris@mnhn.fr

**Keywords:** book review; materials science; Singapore; technology; applied research.

As clearly pointed out in the series title, the volume is one in a long list of books intended to celebrate the first 50 years of independent Singapore (1965–2015), a small but technologically advanced state that acts as a highly successful melting pot harmoniously amalgamating a composite population of about five million inhabitants speaking tens of different languages.

*50 Years of Materials Science in Singapore* describes how a young independent nation like Singapore developed excellent research capabilities in materials science that helped the country make rapid progress in the energy, biomedical and electronic sectors.

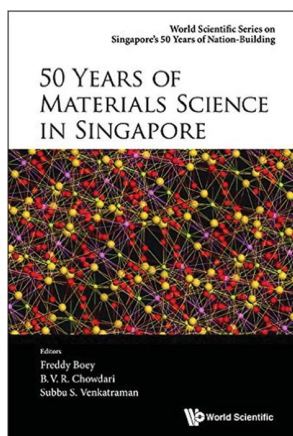
The editors of this volume are well known Singaporean personalities in both academia and business, two fields that represent a successful combination for the state economy. During my years spent in Singapore, I had the chance of meeting these academics and enjoying their capability and decisional power in running 'their worlds', as well, of course, their indisputable science knowledge. The 'worlds' are the high-ranking School of Materials Science and Engineering at the Nanyang Technological University (Professor Boey and Professor Venkatraman) and the biennial ICMAT (International Conference on Materials for Advanced Technologies) conferences (Professor Chowdari, National University of Singapore), as well as, of course, their indisputable scientific status.

The book consists of nine chapters contributed by several Singaporean researchers. Except the introductory and the closing contributions, each article deals with different aspects of materials science developed during the last decades by research groups belonging either to the two Universities or to other research centres active in Singapore. The highly innovative results have been reached through an impressive number of theoretical and experimental methods, including several that are typical of crystallography, thus justifying this review in an IUCr journal.

The first chapter (*Historical Narrative Early Beginnings to Present* by F. Boey) is an overview of scientific and political choices made by Singaporean research authorities during the 50 years of independence to bring the country to the forefront of technological innovation, compared with other Southeast Asian countries, through massive and wise investments to support the materials science research. It clearly appears that the positive evolution of the Singapore 'science-walk' has always been driven by economic governmental plans promoting the industrial and commercial development of the country. Obviously, as it turns out in the next chapters, the research is mainly applied and the impressive number of modern laboratories and highly performing research institutes are primarily devoted to fulfilling the plans. Apparently, almost no space is left to the basic research that, however, is actually well present to support the primary goals.

The following three chapters (*Composites, Nanocomposites and Hybrid Materials* by C. He, X. Hu, Z. Yu and J. Wang; *Materials for Water Remediation (Membranes)* by S. Zhang, L. Luo, Z. W. Thong and T.-S. Chung; *Nanostructured Catalytic and Adsorbent Materials for Water Remediation* by Z. Chen and T. T. Lim) are reports on the state of the art of research applied to different materials specifically tailored for industrial needs. The results are presented in a didactic way.

Chapter 5 (*Solar Energy and Energy Storage Materials and Devices Research in Singapore* by D. Sabba, J. Wang, M. Srinivasan, A. G. Aberle and S. Mhaisalkar) presents



the state of the art on solar energy exploitation and the potential of solar energy storage in terms of devices developed in Singapore. Each paragraph is an abstract of results published along the years; the interested reader may be easily redirected to the references reported in the rich bibliography.

Chapter 6 (*50 Years of Biomaterials Research in Singapore* by S. Venkatraman, S. H. Teoh and A. Miserez) deals with biomaterials and how this branch of materials science has been the source of a high ‘patent activity’. Some basic scientific principles and characteristics of drug delivery, medical devices and hard tissue engineering are given, emphasizing the business returns.

Chapter 7 (*2D Materials* by A. T. S. Wee, K. P. Loh and A. H. Castro-Neto) is an excursus on the development of two-dimensional structured materials that leaves the impression of being too much auto-celebrative, compared with the real advancement of the field in Singapore.

The volume ends with the already mentioned concluding chapter where a short discussion on how, when and where the future of materials science in Singapore will be directed and supported to gain further international ranking. In particular, the accent is on how the applied research might increase both the industrial capability and productivity as well as how to increase the number of graduate researchers within the industrial and economic issue.

Finally yet importantly, each research group presents an impressive list of references concerning its research, a useful tool for those readers that would like to go one step further to better understand what applied research in Singapore is.

Overall, I recommend this book to science-oriented business people and to persons interested in a case example of how properly planned and supported scientific research can boost a modern economy. For crystallographers, it can be rewarding to explore the quoted references and discover how their tools can usefully support applied research.