

BOOK REVIEWS

famous work. However, S. N. Bose had already shifted to Dacca University at the time of his famous work, which was done from Dacca. Two chapters are devoted to two other outstanding faculty members of this Physics Department – D. M. Bose and S. K. Mitra – who should be known to the present-day physics community of India much more than they are. The youngest person covered in the book is K. S. Krishnan, who was never a faculty member of this Physics Department, but was a student of Raman involved in the discovery of the Raman effect. Scholars keep arguing whether Krishnan should have been given more credit for this discovery.

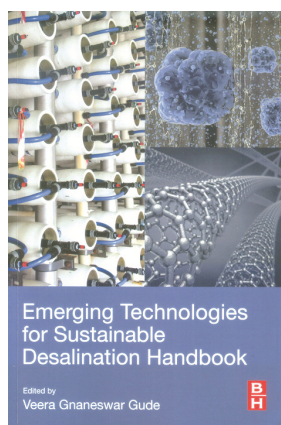
Each chapter gives a biographical outline of the man to whom the chapter is devoted and presents a summary of his scientific contributions. Apart from a short Epilogue in which the authors make some general remarks, the book is primarily descriptive – with very little attempt at analysing the significance of the historical events covered in the book. The different chapters are rather uneven in the style of presentation. For example, the chapter on D. M. Bose gives a complete list of his papers, which is not the case in other chapters. There are no references in the chapters devoted to M. N. Saha and S. N. Bose, though some references are given in other chapters (although the bibliography is highly incomplete in most cases, as I already pointed out). The depth to which the authors delve also varies from chapter to chapter. The chapter on Raman runs to 56 pages. On the other hand, each of the chapters on M. N. Saha and S. N. Bose is of only 16 pages, including several photographs. Readers with some knowledge about the history of Indian physics of that era will probably find nothing new in this book about M. N. Saha and S. N. Bose which they already do not know. However, I liked the chapters on S. K. Mitra and K. S. Krishnan, which are excellently written and are relatively free of the professional lapses I complained above. The chapter on Mitra gives an attractive account of his pioneering work on the upper atmosphere and its impact on his contemporary peers, including an account of how his classic monograph got written. Although the chapter on Krishnan is largely based on his outstanding biography by D. C. V. Mallik and S. Chatterjee, the authors have done an admirable job of summarizing the

main events of his life and his scientific achievements.

The authors do not present much original research in the form of new findings which previous scholars had not noted. Rather, the aim of the book is to provide short accounts of the lives and works of the physicists covered in the book – based primarily on the previous historical accounts of these physicists. As I have already pointed out, the book would have been much more valuable if it were prepared with more proper professional care. Still, scholars as well as general readers will find this book useful as a source of basic information about the important Indian physicists of that era between the two covers of one single book. Each chapter ends with ‘Milestones in the Life of ...’, giving a valuable chronology of the important events in the life of the man covered in the chapter. The book also has a collection of several fascinating photographs. A little more care and thoroughness on the part of the authors could make it a much better book. Still, readers interested in this most extraordinary era of Indian physics will surely benefit from consulting this book.

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Emerging Technologies for Sustainable Desalination Handbook. Veera Ganeswar Gude (ed.). Butterworth-Heinemann, An Imprint of Elsevier, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, United Kingdom. 2018. xxvii + 529 pages. Price: US\$ 250.

The book under review attempts to address the important topic of new and

emerging technologies for sustainable desalination. The water stress around the world with reasons like huge population growth, climate change and improper water management has led to the idea of augmenting water using desalination. Today several technologies have become proven and some are at proof of concept stage. Thermal systems like multi stage flash (MSF), multi effect distillation (MED) are well known and membrane systems like reverse osmosis (RO) are being used. These systems have known advantages and disadvantages and energy requirement continues to be an area of concern. However it is imperative to keep trying out new technologies because desalination is dependent on various factors like whether steam is available, whether water is brackish or seawater. The other concerns should be the operation and maintenance and sustainable utilization of the by products. Some of these issues are supposedly addressed in some of the chapters.

The chapter on Adsorption Desalination gives an overview of what the technology involves. More details could have been provided for the adsorption desalination process itself. Costing section is superficial. The chapter on Forward Osmosis (FO) is interesting and clearly brings out that FO is not viable as a desalination methodology, but more as a pre-treatment for RO for low quality high salinity water. Various piecemeal information regarding membrane distillation (MD) have been put together in the next chapter. Various phenomena and formulations regarding MD have been discussed. But overall a reader cannot finally understand the relevant processes that go into designing a MD system.

Properties of membranes and their surface modification for MD are discussed in the next chapter. The next chapter deals with permeate gap membrane distillation (PGMD). Efficacy of PGMD could not be established. But good literature on MD has been presented. RO energy consumption is given as 6–12 kW/m³, but this information is not up-to-date. The next chapter discusses desalination by pervaporation for which details are provided well. Conclusion and techno-economic analysis are very superficial. The chapter on Humidification De Humidification is crisp and covers required information.

The chapter on spray assisted low temperature desalination technology is

well written. It is evident that this method has higher specific energy consumption than MED. In such a situation, methods to reach MED levels should have also been mentioned. After many chapters in technologies, the focus in the next chapter shifts to nanocomposite membranes. It is purely based on the chemistry and details of nanocomposite membranes. It would have been more useful in the context of this book to also relate the energy requirement for instance, if these composites are used for RO. Content looks open ended. The final aim, if any, of optimization/better performance/low energy requirement needed elaboration. The cost increase, if any, by using such membranes needed elaboration.

Thus far, the book attempts to bring out some emerging technologies. However, many new technologies have not been covered and those are still being studied like ion exchange, electro dialysis, multi-effect humidification and low temperature ocean thermal desalination which have been successfully demonstrated in India. There are also newer technologies like air water generation which is the making of fresh water from atmospheric humidity. Too much emphasis is laid on MD and the chapters are randomly selected without any thread of the types of technologies that need to be studied.

The next section is about recent trends and applications. Under this, the first chapter gives a qualitative analysis of the efficacy of CNTs. Neither experimental nor theoretical results/data are provided to show that CNTs really have advantages over the conventional materials. This chapter is a bit simplistic and not in line with the thrust of the book. The next topic is important and brine from RO systems needs more studies. The chapter brings out several uses of brine. However it is all qualitative. A quantitative assessment for different applications with costing scenario would be more beneficial. The chapter finally touches emerging technologies like FO & MD which seems out of place as their utility or connection for brine treatment is hardly explained. The next chapter appears contrived and it is difficult to understand some aspects. On the one hand, ZLD for the shale gas waste water is emphasized. Then how can MSF be useful? Thermal systems do not create brine; that is their advantage. Membrane systems create brine and only

those can be considered for a ZLD scenario. More than ZLD, the idea of shale gas waste water desalination itself and how to achieve it in a viable manner should have been addressed. The reader is left confused as to whether the chapter is on shale gas desalination or ZLD because they are two different entities. An interesting concept is presented in the next chapter where FO is used for irrigation with soluble fertilizing solution used as a draw solution. The chapter claims that diluted fertilizer DS after water permeation can be directly used for fertigation. Now the efficacy of this has not been demonstrated well and some proper examples would have helped for better understanding of this topic as it is important from the agricultural point of view. The chapter on desalinated seawater for agriculture is very qualitative. First, no mention of the desalination process is made. Desalination itself is expensive today so how can it be viable for agriculture? Today treated waste water may be a better option for irrigation. The chapter gives figures and numbers which do not reveal much and it appears just a fictitious idea since the farms will have to necessarily be on the coast. This chapter is very vague and lacks any technical details. Solar stills make very low quantities of fresh water. The chapter makes it appear that large solar stills may be possible as large sources of fresh water, which is not the reality. This chapter needs to have technical calculations to substantiate the possibility.

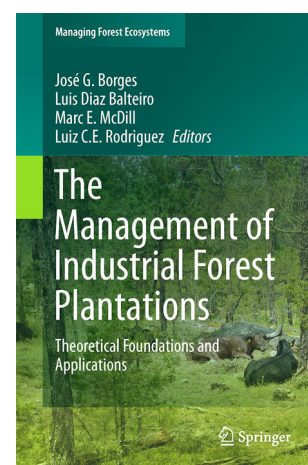
The structure of the book into two parts, one for emerging technologies and the other for trends and applications, is not consistent with the chapters populating those sections. The chapters in the first section are vague with no numbers to substantiate. The topics are good and relevant but contents are a bit lacking. It appears there were a few more chapters available and hence they have been grouped under trends and applications. None of the chapters in this section is either well thought of, or accurate. This section could be in fact removed entirely. Many chapters try to include a cost component but the facts and assessments are lacking. Most of the chapters start off well with an intent to address the topic but they seem to stray into areas not relevant to the topic at hand.

This book could have been useful had it been put together in the following

order – new technologies and their descriptions, components for optimization in each of these methods, energy optimization for these technologies, use of renewable energies and finally some specially described applications of the recently developed technologies. A consistent costing methodology for all the desalination methods would put all the methods on a common platform and costing more realistic.

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The Management of Industrial Forest Plantations: Theoretical Foundations and Applications. José G. Borges, Luis Diaz-Balteiro, Marc E. McDill and Luiz C. E. Rodriguez (eds). Springer, Dordrecht. 2014. xiii + 543 pages. Price: 119.99€. Volume 33, Series title: Managing Forest Ecosystems. ISSN 1568-1319; ISSN 2352-3956 (electronic); ISBN 978-94-017-8898-4 and ISBN 978-94-017-8899-1 (eBook).

With the necessity to meet the growing wood demand, plantations are raised on a large scale. The means to manage such large-scale industrial plantation is the key theme of the book under review. The editors have made such a valuable work in production forestry by compiling the information from more than 35 contributors. This book is the 33rd volume in the series – *Managing Forest Ecosystems*, published by Springer.