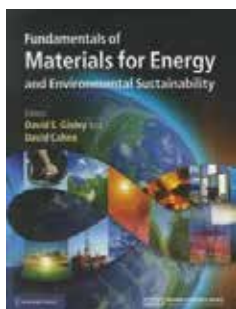


RECENSIONI



D. S. GINLEY AND D. CAHEN (EDITORS)

FUNDAMENTALS OF MATERIALS FOR ENERGY AND ENVIRONMENTAL SUSTAINABILITY

Cambridge University Press, Cambridge, 2012

pp. 772, £. 135,00, US\$ 122,73
ISBN 9781107000230

How to get into the fascinating and multidisciplinary world of renewable and sustainable energies

Production, storage and distribution of energy are some of the most critical and important issues for the present day and an incredible challenge for the future. Along with water and food provisioning, sustainable energy production is at the top of the human race's emergency list, forcing scientists, politicians, economists and sociologists to become increasingly involved in this fascinating field. Future generations must be woken up about and educated on the production and use of energy. In particular, physicists, chemists, engineers are called on to make a strong contribution in this direction, not only by working on focused and specialized topics, but also by building strong interdisciplinary interactions, so as to have a global vision of the needs and possible solutions from different perspectives.

To train scientists with the right skills and knowledge, their education on the multiple aspects of renewable and sustainable energies should already start at high school and at an undergraduate level. While there are a huge number of highly specialized textbooks focusing on the different kinds of energy sources, just a few publications are available which give general, basic formation on this topic. Two typical approaches can be found in books: a very simplistic and often trivial description aimed at the general public or, at the other extreme, a very detailed exposition for specialists and scientists.

The book "Fundamentals of Materials for Energy and Environmental Sustainability", by David S. Ginley and David Cahen, is a good example of simplicity, completeness and scientific rigor. Although the book is based on material science, stressing the role of materials in the production, storage and distribution of the most important kinds of renewable and non-renewable energy sources, it also gives an overview of fundamental topics such as climate change, the provision and the cost of materials for present and future technologies.

The Editors are among the most recognized authorities at international level, with decades of leading experience in the field of renewable energies. They have also made their own contribution to the book as co-authors of two of its chapters.

The book itself is extremely well organized, divided into 6 main parts, each in turn subdivided into chapters, whose authors are outstanding scientists and experts in their own rights. Each chapter starts with a focus, synopsis and historical perspective, so as to help the reader have a clear vision of the selected topic. Moreover, each chapter ends with a summary, questions for discussion, suggestions for further reading and a large number of references. In this way, the reader has a multiple level access to each specific argument, from a basic overview, with almost no mathematics, to a deeper approach. The book is therefore suitable for various education levels, from high school to undergraduate and PhD courses. The appendices and the general alphabetic index at the end of the book are also very useful.

Part 1 gives a global vision of the energy landscape, starting with climate change and touching on several critical points such as security, sustainability and costs, with a direct connection to provision and use of materials. This chapter gives the reader the primary information necessary to access the topics in the rest of the book.

Part 2 introduces non-renewable energy sources which are, and still will be for many years, the most used, requested and efficient sources of energy. All scientists and experts working in the field of renewable energy should have as a reference the energy producing capacity given by non-renewable materials such as coal, oil, gas, hydrates and nuclear fuels.

Part 3 enters into the world of renewable energy sources, explaining and discussing the most important or promising technologies.

The solar part, in all its possible aspects, is widely treated, but also energy from bio-fuels, geothermal sites, oceans and wind are both presented and discussed.

Part 4 is entirely dedicated to transportation. This is one of the most important aspects for society, where people and things are continuously transported with a need for increasing speed and distances. Materials face new requests every day in this area as well and the book presents the importance of material science for ground, water and air transportation. Another chapter is also dedicated to autonomous vehicle technology.

Part 5 deals with energy efficiency and energy saving, which is as important a topic as energy production. New materials for lighting and buildings are among the most important challenges for the future and any production of energy must be supported by its smart use. In the same direction goes the recycling of materials and products, also discussed in this part of the book.

Part 6 concerns two fundamental steps after energy production: storage and distribution. Efficient storage is mandatory to use renewable sources on a large scale, while smart grids have been indicated for many years, as necessary for any kind of energy distribution if we want to maintain the growth rate of current human society.

In conclusion this book should be considered as a textbook in courses dedicated to renewable energies, as well as being a very good starting point as a complete and updated reference source for anyone involved in this field.

A. Terrasi
Dipartimento di Fisica e Astronomia,
Università di Catania and
MATIS-IMM-CNR, Catania