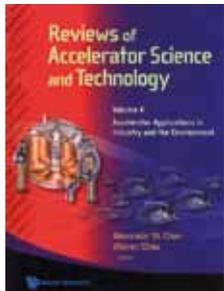


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REVIEWS OF ACCELERATOR SCIENCE AND TECHNOLOGY

Accelerator Applications in Industry and the Environment
Vol. 4

World Scientific, Singapore, 2011

pp. VIII + 291; \$168.00

ISBN 978-9-814-383981

The book is a very interesting collection of fourteen articles on Accelerator Applications in Industry and the Environment. The first eleven articles contain a detailed description of the accelerators used for several types of applications. Then a review of prospects for accelerator technology is given. The following article is dedicated to CERN and its outstanding achievements. The final paper describes the strong personality of the Nobel Prize Simon van der Meer, who passed away in 2011.

The article by Sueo Machi mainly describes the applications of electron beam accelerators. These machines have been used for 50 years for many applications involving the modification of polymeric materials to create improved products as well as to sterilize medical products. They are also currently used to protect the environment and even to save energy. The article by Lawrence Larson, Justin Williams and Michael Current is focused on ion implantation as a diffused method in the production of semiconductors, advanced engineering materials and photonic devices. A review of different types of accelerators, depending upon the required performance in energy and intensity, is presented. The article by Chris Jeynes, Roger Webb and Annika Lohstroh is a review of several Ion Beam Analysis methods. The described applications are studies of defects in semiconductors, surface studies and depth profiling, but more emphasis is given to thin-film depth profiling using Rutherford backscattering and particle-induced X-ray emission. The article by J.F. Harmon, D.P. Wells and A.W. Hunt describes the use of neutrons and photons in non-destructive detection, like contraband detection and materials analysis.

The article by Paul Schmor is a review of cyclotrons for the production of radioactive isotopes for medical and industrial applications. Nowadays most of the cyclotrons

are used for production of short-lived radioisotopes to be used in PET and SPECT medical diagnostics, but there is a quite high number of cyclotrons used for production of long-lived radioisotopes for therapeutic as well as for industrial applications. Commercial cyclotrons provide multiple beams with energies from 3 to 70 MeV and their number is rapidly increasing, demonstrating that the cyclotron is the ideal accelerator for many types of applications. The article by Jiaer Chen, Zhiyu Guo, Kexin Liu and Liping Zhou reports many details on Accelerator Mass Spectrometry and its applications. Some examples of applications in the field of earth and environmental sciences, archaeology, biomedical sciences, nuclear astrophysics and nuclear environmental safeguards are given.

The article by Andrzej G. Chmielewski concerns the applications of electron accelerators for the control of environmental pollution, in particular for the purification and treatment of gaseous, liquid and solid wastes. Other possible applications in the field of protection of environment and human health are illustrated. The article by Peter Hosemann is a study of radiation damage in structural materials induced by ion accelerators. The importance of this application is very much underlined: a limiting factor of the use of materials for large-scale engineering applications is the damage they can sustain due to radiation, temperature, stress over a certain period of time. Ion beam irradiation by means of accelerators is a cost-effective method to study radiation damage. The article by Ragnar Hellborg and Harry J. Whitlow is focused on direct current accelerators for industrial applications. Most of the paper describes the accelerators and their subsystems, like ion and electron sources, high-voltage generators, controls. The last part is dedicated to applications, like ion

implantation and electro-beam lithography.

The article by Marshall R. Cleland is a description of the good performance of radio-frequency electron accelerators, which can be used for industrial applications like material curing, electron beam and X-ray processing, ionizing radiation, radiation dose analysis, radiological safety. The article by Guenter Mank, Guenter Bauer and Françoise Mulhauser reviews different accelerators for neutron generation in the small and medium energy range. Several examples of applications are also given, from radioisotope production to data mining and demining to neutron capture therapy. The article by Alan Todd on prospects for accelerator technology underlines the importance of accelerators in several fields related to common life, like discovery science, energy and environment, medicine, security and defense, material processing, giving also some details on the market size of the accelerators sales and related products.

The article by Herwig Schopper is a historical review of the development of CERN from its birth to the present time, including the very recent commissioning of LHC. Emphasis is given to the importance of cooperation among nations. The article by Vinod C. Chohan concludes the series of papers, describing the remarkable contribution to accelerator science given by Simon van der Meer, who got the Nobel Prize in 1984 together with Carlo Rubbia for the discovery of the field particles W and Z, communicators of weak interactions.

All in all, the book is a very helpful way to be introduced in the world of the accelerators as powerful tools to carry out a quite big number of applications that play a significant role in common life.

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