



Advances in Lasers and Applications, Edited by D. M. Finlayson and B. D. Sinclair, Institute of Physics, 1999, ISBN 0750306327 (pbk); Price: US\$49

Since the advancement of high-power and efficient laser diodes, solid-state lasers pumped by diode lasers are taking a good share of research activities. Advances in ultra-short pulses and optical parametric oscillators have allowed the development of a wide range of laser applications.

The book *Advances in Lasers and Applications*, edited by Finlayson and Sinclair, is essentially the proceedings of the 52nd Scottish Universities Summer Schools in Physics. It has thirteen review articles written by experts in their respective fields. The book can be divided into two obvious sections. The first has seven articles focused around the science of solid-state lasers, optical parametric oscillators, and generation of ultra-short pulses. The second section consists of six articles on different applications.

The book starts with a nice review article by Drs. Hanna and Clarkson of Southampton University in which the authors emphasize those aspects of diode-pumped solid-state lasers that relate to the problems associated with power scaling. The following article is on the continuous-wave visible solid-state lasers obtained by using intracavity second-harmonic generation and sum-frequency mixing as well as up-conversion pumping. The next article discusses details of fiber and waveguide lasers. The rest of the articles in the first section are devoted to optical parametric oscillators, attosecond pulse generation, and materials for lasers and nonlinear optics.

The second section explains some applications of lasers. It starts with "Medical Lasers: Fundamentals and Applications", in which the author covers the basics of laser-tissue interactions, one imaging technique, and a brief overview of various applications. The article "Solid-State Lasers and Nonlinear Optics for Lidar", describes the applicability of all-solid-state lasers with harmonic generation for atmospheric monitoring. In "Challenges for New Laser Sources for the Defence Industry", a brief review of the two military applications of lasers is presented. In "Lasers for Interferometric Gravitational-Wave Detectors", a worldwide effort in the development of both ground- and space-based searches for gravitational radiations are discussed. In "Lasers in Material Processing", some details of the process are discussed and it is speculated that eventually diode lasers will replace lamp-pumped solid-state lasers. In the article "Applications of Ultra-Short Pulses", the uses of short pulses in optical-coherence tomography, material processing and communications are described. Optical-coherence tomography provides amazingly clear insights about fundamental processes in photophysics and photobiology.

This book is not for beginners: the reader should already have some knowledge of the field. It will definitely benefit graduate students and researchers working in, or intending to work in, solid-state lasers or nonlinear optics. The first section provides a relatively coherent review of the advancements in different aspects related to solid-state lasers. The second section on applications just gives a flavor of a few applications. Some of the articles fall short of providing a comprehensive review of the particular application.

In conclusion, I feel that the book is useful for researchers and graduate students working in the field of solid-state lasers.

Masroor Ikram
Pakistan Institute of Engineering and Applied Sciences
Islamabad, Pakistan