

## Special Issue Papers

# Introduction to the Special Issue on Lasers in Biology and Medicine

**L**ASER technology has opened a new era in biology and promises to play an important role in medicine. In biology, the techniques of laser spectroscopy have probed the structure of biological molecules while time-resolved spectroscopy has elucidated the dynamics of biological processes. In medicine, the laser is gradually being accepted as a tool for diagnosis and treatment. It is fast becoming the treatment of choice for different cancers. Most exciting is the photoradiation method which combined lasers with light-sensitive dyes for cancer therapy. In ophthalmology, lasers have been widely adopted for several noninvasive surgical procedures. Within a decade, lasers may be used routinely on glaucoma and cataracts. In other medical fields, lasers can be used to reach inaccessible areas of the body and to perform delicate and precise operations on the brain, spinal cord, and heart.

The goal of this Special Issue of the IEEE JOURNAL OF QUANTUM ELECTRONICS is to bring scientists from all sides together so that they may better understand the scientific and technical problems they face in the medical, biological, and laser fields. We hope that this effort will bridge the communication gap between the scientists who develop the lasers and techniques and those who apply them to biomedical research.

This Special Issue has been organized into five sections as follows:

- Lasers as a Research Tool in Biophysical Systems
- Lasers in Medicine And Surgery
- Lasers in Ophthalmology
- Interactions of Laser Radiation with Tissues
- Lasers as a Diagnostic Tool in Medicine.

In publishing a Special Issue devoted to lasers in biology and medicine, the IEEE JOURNAL OF QUANTUM ELECTRONICS affirms its commitment to providing a forum for this increasingly significant field. We personally wish to thank all of our colleagues who submitted papers and who served as reviewers. Special thanks to the National Institutes of Health, and the Department of Physics and the Department of Electrical Engineering at the City College of New York for supporting this effort.

ROBERT R. ALFANO  
 APOSTOLOS G. DOUKAS  
*Guest Editors*



Robert R. Alfano was born in New York, NY, on May 7, 1941. He received the B.S. and M.S. degrees in physics from Fairleigh Dickinson University, Teaneck, NJ, in 1963 and 1964, respectively, and the Ph.D. degree in physics from New York University, New York, NY, in 1972.

From 1964 to 1972 he was a member of the Research Staff at General Telephone Research Laboratories, Bayside, NY, where he conducted studies on linear and nonlinear optical properties of materials and picosecond laser spectroscopy. Since 1972 he has been a Professor with the Department of Physics at the City College of New York, New York, NY, and in 1983 became the Herbert Kayser Professor of Electrical Engineering. He is also the Director of the Institute for Ultrafast Spectroscopy and Lasers and the Photonic Engineering Center.

Dr. Alfano is a Fellow of the American Physical Society and previously was an Alfred P. Sloan Fellow.



Apostolos G. Doukas (M'82) was born in Thessaloniki, Greece. He received the B.S. degree in physics from the University of Thessaloniki, and the Ph.D. degree from the City University of New York, New York, NY.

He joined the Institute for Ultrafast Spectroscopy and Lasers, New York, NY, in 1978. He is currently Assistant Director of the Institute and a Research Associate Professor with the Department of Physics at the City College of New York, New York, NY. His current interests are in time-resolved spectroscopy in biophysics and condensed matter.

Dr. Doukas is a member of the American Physical Society and the New York Academy of Sciences.