

## Optical Science and Engineering in Romania

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This special section of *Optical Engineering* of May 1996 is dedicated to optical engineering research in Romania.

In Romania, as in many other countries, the development of laser devices contributed to a boost in research in optics, in general, and especially in optical engineering. In 1961, after the first report of a He-Ne laser operation by Javan and co-workers, Romania was among the first countries to develop such a device; this was done in 1962. At the 3rd Conference on Quantum Electronics, Paris, February 11–15, 1963, Romanian researchers from the Institute for Atomic Physics (IFA) of Bucharest presented the paper “Contributions to the study of gas lasers.” In the years that followed, the Laser Department was established within IFA. The development of research in the field of lasers in this department inspired other optics-oriented institutions to change their guidelines to focus on the newly emerged directions in optics. Year after year, new groups interested in optical engineering studies appeared.

At present, some of these groups include already trained staff and have begun to report valuable results. The Romanian research institutions that have been obtaining good results for quite a long time are: the Laser Department of the Institute for the Physics and Technology of Radiation Devices (IFTAR), IFA; the Institute of Optoelectronics, Măgurele, Bucharest; and the Laboratory of Semiconductor Materials of the Institute for the Physics and Technology of Materials (IFTM), IFA. Within the same research orientation, other institutions that have contributed with sustained efforts are: the Institute for Research on Condensed Matter in Timișoara; the Center for Research in Applied Physics of the Physics Department in

the “Politehnica” University of Bucharest (UPB); the Optoelectronics Group of the Electronic Technology and Reliability Department of the UPB; the Applied Optics Group of the Fine Mechanics Department of the UPB; and the Optics, Spectroscopy, Laser and Plasma Department of the Faculty of Physics, Bucharest University.

Progress in optical engineering is to be noted in the activity of the Optoelectronics Division of the Institute for Research on Electronic Components (ICCE), Băneasa, Bucharest; the Optoelectronics Division of the Microelectronics Plant, Bucharest, and the ProOptica Factory, Bucharest.

In the last 15 years, and despite many difficulties, several national and international conferences in optics, quantum electronics, and optoelectronics have been held as a result of the efforts of the Romanian researchers from these scientific institutes and universities.

The results obtained by Romanian scientists in the above-mentioned fields have been published in SPIE Proceedings and in worldwide circulation journals such as *Optical Engineering*, *IEEE Journal of Quantum Electronics*, and *Optics Communications*, as well as in Romanian journals dedicated to pertinent topics, such as the *Romanian Journal of Physics*, *Physics Reports*, *the Annals of the Bucharest University*, *the Scientific Bulletin of the “Politehnica” University of Bucharest—the Mathematics and Applied Physics Series*.

Due to space constraints, the 44 papers that Romanian researchers contributed to this special section of *Optical Engineering* were divided between the May and June issues. The entire special covers 15 main topics: lasers; materials and optical components; plasma and lasers; thin

films; laser interferometry; laser metrology; materials for optoelectronics; applications in medicine and biology; laser photochemistry; holography; optical processing; theoretical modeling; laser radiation and propagation; optical ablation; and other miscellaneous topics.

A brief presentation of the subjects addressed, referred to in the same order as the above-mentioned topics, follows. In the May issue, seven papers report results of experimental studies on laser operation: passive Q-switch, spectroscopic data, and AlGaAs-based buried heterostructure diode lasers; eight papers are dedicated to the characterization and design of optical components like dichroic mirrors, gradient-index lenses, and Er:Ti:LiNbO<sub>3</sub> optical waveguides; nine papers present studies on plasma and lasers, thin films, laser interferometry, metrology, photochemistry, holography, materials for optoelectronics, and optical processing of information; three papers describe medical and biological applications of lasers and new biological effects of laser radiation and nonlinear optical materials; and holographic interferometry results are presented in four papers. In the June issue, optical processing simulations are presented in two papers; another six papers deal with theoretical modeling of various phenomena and devices: soliton propagation in optical fibers, ion-exchange and Er:Ti:LiNbO<sub>3</sub> optical waveguides, rough surface scattering of laser radiation, and the squeezed states of light; and five papers refer to aspects of laser beam propagation, optical ablation, and miscellanea.

As noted from the authors' affiliations, some papers were completed in cooperation with researchers from Italy, France, Germany, the Republic of Moldova, the United Kingdom, and the United States, as a result of our fruitful common projects with institutions from these countries.

Our hope is that the papers presented in this special section will contribute to a better understanding of the present status and future prospects of optical engineering in Romania.

We thank the contributing authors for their efforts and the referees for their useful suggestions and observations.

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Also, we express our gratitude to Dr. Brian J. Thompson for his understanding and kind support to us in publishing this special section.



**Ion M. Popescu** is the head of the Department of Physics, "Politehnica" University of Bucharest. He received the Dipl.Phys. degree from the Faculty of Electronics and Telecommunications, "Politehnica" University of Bucharest, in 1956 and the PhD degree in 1966. Since 1956 he has been with the Institute for Atomic Physics of Bucharest and since 1967 with the Physics Department, "Politehnica" University of Bucharest. Between 1963 and 1964, he spent one year at the "Ecole Normale

Supérieure" of Paris specializing in the optical methods of the hertzian spectroscopy field. His current research work is concentrated in double magneto-optics resonance and optical pumping (in which he obtained his PhD degree), lasers, and nonlinear optics. In 1977 and 1983 he was awarded the "Constantin Miclescu" prize by the Romanian Academy. He has written 25 books and more than 260 scientific papers. The book *Optical Methods of Radio-Frequency Spectroscopy* was published by Adam Hilger Ltd. (London, 1975) and John Wiley & Sons (New York, Toronto, 1975). Since 1969 he has been a member of the European Physical Society; he has also been a member of IEEE since 1986 and a member of SPIE since 1991. In 1994 he became the president of the SPIE—Romanian Chapter (SPIE/RO). He has made original contributions in the optical methods of hertzian spectroscopy (double magneto-optics resonance and optical pumping), lasers, plasma lasers, and nonlinear optics.



**Dan C. Dumitras** received the MSc degree in electronic engineering from the Polytechnical University of Bucharest in 1970 and his PhD in 1978 from the Institute of Atomic Physics, on the subject of waveguide lasers under Professor Ion M. Popescu's guidance. In 1970 he joined the Department of Lasers at the Institute of Atomic Physics in Bucharest. His major areas of research have been in lasers and related fields, particularly sealed-off CO<sub>2</sub> lasers, frequency-stabilized CO<sub>2</sub> lasers, medical laser instrumentation, and laser photoacoustic spectroscopy. He is the author of a book, *Gas Lasers*, published in 1982 by the Romanian Academy of Sciences. He has authored or coauthored more than 80 papers published in technical journals and made more than 80 presentations at national or international conferences, and has been granted seven patents. Dr. Dumitras received the Romanian Academy Award for Physics "Dragomir Hurmuzescu" in 1978 and the Gold Medal Award at the National Invention Saloon in 1979. He is currently senior scientist and head of the Department of Lasers of the Institute of Physics and Technology of Radiation Devices in Bucharest. He is a member of SPIE, EOS, the Romanian Physics Society, and the Romanian Society for Lasers in Medicine and Biology. He now acts as vice-president of the Romanian Chapter of SPIE.



**Nicolae N. Puscas** received the Dipl. Phys. degree from the Physics Faculty of Cluj-Napoca in 1976 and the PhD degree in physics in 1991. From 1981 he has been with the Physics Department, University "Politehnica" Bucharest, as an associate professor. His current research work is concentrated in the fields of nonlinear optics and optical waveguides. In 1983 he was awarded by the Romanian Academy with the "Constantin Miclescu" prize. Between 1993 and 1995 he spent one year at Politecnico di Torino (Italy), Dipartimento di Elettronica. He has written 6 books and more than 60 scientific papers. From 1989 he has been a member of the European Physical Society and from 1990 a member of SPIE—Romanian Chapter and of the European Optical Society. He has made original contributions in several order harmonic generation theoretical analysis in gaseous mixtures and liquids, experimental studies concerning the second- and third- harmonic generation in organic liquids and suspensions, and characterization of optical waveguides using nondestructive methods (loss, near field, and transmission spectra measurement, refractive index profile determination).