

BIBLIOGRAPHY

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A review of the monograph 'Copper Vapour Lasers: Design, Characteristics and Applications' by A.G. Grigor'yants, M.A. Kazaryan and N.A. Lyabin (Moscow: Fizmatlit, 2005, 312 pp.)

V.M. Batenin, N.A. Generalov

Interest in the applications of lasers in various spheres of human activity has been growing steadily in the world. This is due to their wide applications in medicine, industry, communications, research, etc. Although the level of development of modern copper vapour lasers is rather high, research aimed at improving their basic characteristics still continues, broadening the range of their applications in fields covering projection television, microscopy, material processing, probing of the atmosphere, seas and oceans, marine and air force navigation, isotope separation, particle acceleration, dermatology and cosmetology, angioplastic surgery, oncology, etc.

The first attempt to summarise the results of investigations of self-contained metal vapour lasers, also known as metal vapour lasers was made in the monograph 'Self-Contained Metal Vapour Gas-Discharge Lasers' by A.N. Soldatov and V.I. Solomonov (Novosibirsk: Nauka, 1985, 151 pp.). This monograph describes the results of physical studies and applications of these lasers in various fields of science and technology.

By the mid-1990s, the results obtained during physical investigations of these lasers became so numerous that a separate voluminous book was needed for their generalisation. Such a monograph entitled 'Self-Contained Metal Vapour Lasers' (Moscow: Nauchnaya kniga, 1998, 544 pp.) was written by V.M. Batenin, V.V. Buchanov, M.A. Kazaryan, I.I. Klimovskii, and E.I. Molodykh. Although the studies of such lasers are by no means completed, the new results, supplementing and extending the results that have been already generalised in the monograph, still lie within the framework of scientific concepts presented in the book.

The obvious advantage of another monograph by C.E. Little on metal vapour lasers entitled 'Metal Vapour Lasers: Physics, Engineering and Applications' (Chichester, London: J. Wiley and Sons, 1999, 620 pp.) is that it combines in a single volume all the scientific and technical aspects of research and development as well as applications of these lasers. However, it is known that in such an approach aimed at an all-round investigation of the problem, detailed analysis of its individual aspects is inevitably curtailed.

Until recently, one of the most poorly addressed problems in various monographs on metal vapour lasers was the technology of preparation of emitters for such lasers, and above all the production of sealed copper vapour lasers which are the most promising lasers of this type. No monograph in Russia or abroad was devoted to a generalisation of the results of technological studies and design of such emitters.

The technologies of production of metal vapour lasers are unique in that their final product must be a device (emitter) combining in itself mutually exclusive properties (for example, the need to provide a high chemical purity of the active medium for temperatures of the gas-discharge tube walls of 1500 – 1600 K as well as a high homogeneity of metal vapour along the discharge tube under conditions of their diffusive losses through the end-faces of this tube). Specialists working in the field of research and development of metal vapour lasers were aware of the fact that these and many other technological problems associated with the designing of commercial samples of copper vapour laser emitters had been tackled successfully at the Istok Scientific and Production Association, where a unique technology for the production of various metal vapour laser emitters has been developed in the course of the past three decades, and has acquired the same status as the technologies for production of thyratrons and magnetrons. The technological achievements of Istok have made it possible to use copper vapour lasers in different systems designated for solving specific applied problems.

Until recently, the results of technical investigations and developments in the fields of metal vapour lasers and laser systems based on them were apparently accessible in entirety only to the scientists working at Istok. However, the publication of the monograph 'Copper Vapour Lasers: Design, Characteristics and Applications' by A.G. Grigor'yants, M.A. Kazaryan and N.A. Lyabin (Moscow: Fizmatlit, 2005, 312 pp.) has now made these results public and available for scientific community at large. The results of investigations performed at Istok are unique and do not have commensurate analogues. Therefore, there is no point in discussing any individual part of this monograph. It will be much more helpful to the specialists in laser physics and engineering, as well those involved in designing high-temperature and plasma-chemical devices to read this monograph. It can be stated with confidence that this book will serve as a source of useful information for both categories of specialists.

The only critical remark about the monograph is that the examples of application of copper vapour lasers cited in the book are based predominantly on the experience gathered at Istok and do not provide an extensive coverage of all possible lasers of this type for solving a wide range of applied problems. Apparently, a separate monograph should be devoted to generalise all the possible applications of metal vapour lasers.

The evaluation of the contribution made by several organisations to the studies of physical processes in self-contained lasers should also be treated as subjective. Nevertheless, the book can be used gainfully as a practical guide on copper vapour lasers and their design features. It should be quite useful for a wide range of readers interested in specialising in the fields of gas discharge, physics and technology of lasers.

V.M. Batenin Joint Institute for High Temperatures (IVTAN), Russian Academy of Sciences, Izhorskaya ul. 13/19, 127412 Moscow, Russia;
N.A. Generalov Institute for Problems in Mechanics, Russian Academy of Sciences, pr. Vernadskogo 101-1, 117526 Moscow, Russia

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Translated by Ram Wadhwa