

II Asian – Pacific Conference on Fundamental Problems of Opto- and Microelectronics

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Abstract. A review of papers reported at II Asian–Pacific Conference on Fundamental Problems of Opto- and Microelectronics is presented.

Keywords: optoelectronics, microelectronics, laser physics.

II Asian–Pacific Conference on Fundamental Problems of Opto- and Microelectronics was held at the Far Eastern State Technical University (FESTU, Vladivostok) from 30 September to 4 October 2002. The conference was organised by FESTU, Institute of Automatics and Control Processes, Far Eastern Division, Russian Academy of Sciences (FED, RAS), Institute of Problems of Marine Technologies (FED, RAS), and Marine State University. The conference was supported by the Integration Federal Target Program, the Russian Foundation for Basic Research, the Presidium of FED, RAS, and the Russian Division of SPIE.

The first conference on this topic was held two years ago. It was initiated by academicians of RAS Yu.N. Denisyuk, E.M. Dianov, and the corresponding member of RAS L.D. Bakhrakh. The conference has played a significant role in the development of science and the attraction of young people and administrative regional structures to the fundamental scientific studies in a remote but very important region for the economics of Russia such as Far East. The main tasks of the conference have been formulated as follows:

- (i) the development of fundamental studies and education in the field of priority trends in science and technology such as optoelectronics and microelectronics, which play a decisive role in the improvement of systems for data communication and processing, as well as in information technologies and instrument making;
- (ii) the establishment of a scientific cooperation with scientists in countries of the Asian–Pacific region; and
- (iii) the acquaintance of young scientists with modern advances in opto- and microelectronics and their implication to scientific studies.

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A number of well-known Russian and foreign scientists entered the international Program and Organising Committees of the present conference.

The conference chairman was a deputy head of FESTU, professor Yu.N. Kul'chin, whose scientific school is well known by the studies of distributed fibre information-measuring systems. More than 80 scientists from Russia (Moscow, St. Petersburg, Samara, Rostov-on-Don, Kaliningrad, Novosibirsk, Tomsk, Irkutsk, Khabarovsk, Yuzhno-Sakhalinsk, Vladivostok), Georgia, Azerbaidzhan, Germany, USA, Japan, and China participated in the conference. 45 oral and 6 stand reports were presented. The official language of the conference was English.

The reports were presented in four sections:

- (1) Fibreoptic telecommunication systems and fibreoptic sensors.
- (2) Optical data processing and holography.
- (3) Laser physics and nonlinear optics.
- (4) Low-dimensional semiconductor structures for optoelectronics.

The commutation of optical channels, the parameters of waveguide periodic structures, as well as the reducing of the effect of interference on the quality of data transmission in fibreoptic communication lines were discussed in the first section. Many reports were devoted to fibreoptic sensors: sensors of biological objects, mechanical deformations and strains, temperature, position, the velocity of liquid flows, etc. The analysis of the reports demonstrates a distinct trend of passing from the development of individual sensors of physical quantities to the creation of distributed and quasi-distributed measuring lines and distributed measuring networks based on these sensors. It was pointed out in discussions that the developed quasi-distributed fibreoptic measuring lines based on Bragg fibre sensors and sensors based on single-fibre multi-mode interferometers are devices that are now most appropriate for the use in practical systems for monitoring of the state of buildings and constructions.

In the second section, of great interest were reports devoted to the development of invariant correlation filters for pattern recognition, the study of correlation methods for image processing in track chambers and the creation of stable correlation–optical nonlinear cryptographic systems. The reports on optical holography were devoted to recording media based on bichromated gelatine, the development of the methods for hologram copying, two-pulse holographic interferometry, and the application of holographic interferometry for determining the direction of

the object motion. A report on the application of holographic interferometry in stomatology for the choice of the optimal construction of the teeth prosthesis for a patient attracted great interest. A number of reports were devoted to the use of optical methods for processing signals from fibreoptic sensors and distributed measuring systems. It was shown in the reports that a combination of optoelectronic methods with neural technologies of signal processing makes it possible to achieve a significant success.

In the subsection of laser physics of the third section, the problems of the development of waveguide lasers were considered. The reports were devoted to integral-optical distributed-feedback dye lasers and the studies of Raman fibre lasers and amplifiers. The reports on the theory of transformation of Gaussian optical beams and the studies of the possibility of a direct intracavity coupling of laser radiation into multi-mode optical fibres attracted great attention. In the subsection of nonlinear optics, the studies of the influence of stimulated Brillouin scattering on the propagation of nanosecond laser pulses were reported. A great attention was devoted to the study of characteristics of nonlinear BTO and KTiOPO_4 crystals, which are promising for the creation of systems for optical data processing, crystals based on thallium compounds, as well as to the hologram recording in photorefractive crystals and photopolymers. The model of nonlinear optical interaction of light waves in a reflection hologram recorded in a BTO crystal was first described. Note also the reports devoted to the theoretical and experimental studies of photorefractive crystals used for creation of adaptive fibreoptic measuring systems and for signal processing in distributed fibreoptic measuring networks, which opens up broad possibilities for the use of these crystals in industrial measuring devices.

The reports delivered in the fourth section were devoted to the study of epitaxial gallium nitride diode lasers, the investigation of optical, electrophysical, and photoelectrical properties of epitaxial layers with different compositions and stoichiometry on the surface of silicon single crystals of different orientations. A comprehensive report of Yu.V. Kopaev on the modern physical models of high-temperature superconductivity attracted a great attention.

During the time of the conference, the exposition 'Artistic Holograms' presented by the Media Scientific and Technological Company (Moscow) was demonstrated. This interesting exposition was very popular among the residents and guests of Vladivostok.

The proceedings of the conference will be published in a separate issue of Proceedings of SPIE. The next conference will be held in September 2004 at Irkutsk, and the workshop on Optical Measuring Methods will be held in September 2003 at Vladivostok.