

Invention Competition
(for the participants from the Belorussia, Russia and Ukraine)
in frames of 12th International Symposium “Advanced Display Technologies”

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Hotel Complex of Mashpribor Institute in Korolev City, Moscow Region

Organizer: Russian SID Chapter

Sponsor: SID Texas Chapter

Information Sponsors: Information Display

Izobretatel i Ratsionalizator (Inventor & Inventor)

LIST OF PARTICIPANTS

1. Alexander M. Ilyanok, Atomic and Molecular Engineering Laboratory, Minsk, Republic of Belarus. Title of invention(s): a) Quantum-Size Electronic Devices and Operating Conditions Thereof, b) Self Scanning Flat Display.
2. Tsvetkov V.A., Tsvetkov O.V., Tsvetkov I.V., Dolgoprudnyi, Moscow Region, Russia. Title of invention(s): Diffraction LCDs.
3. S.V. Pasechnik, V.G. Chigrinov*, V.A. Tsvetkov, D.V. Shmeliova, A.N. Voronov, Moscow State Academy of Instrument Engineering & Computer Sciences, Moscow, Russia; *Shubnikov Institute of Crystallography, Moscow, Russia. Title of invention(s): New Optical Method And Set-Up For Shear Viscosity Measurements In Liquid Crystals.
4. Rybalochka A., Sorokin V., Nazarenko V. *, Sorokin A., Institute of Semiconductor Physics NAS Ukraine, *Institute of Physics NAS Ukraine, Title of invention(s): Drive schemes for matrix cholesteric liquid crystal display.
5. A.V. Boroshnev, N.F. Kovtonyuk, T.V. Zakharova, A.L. Klyukin, et al. Cometa Central R&D Institute, Moscow, Russia. Title of invention(s): The block of inventions devoted to devices for image transformation and projection in information displays.
6. G.G. Demirchoghlyan, V.B. Filippov, Russian Foundation for Engineering Rehabilitation of Low Vision and Blind Persons, Moscow, Russia; Russian Research Institute of Physical Training and Sports, Moscow, Russia. Title of invention(s): Electroskin Substitution Of Human Vision (Display For Low Vision And Blind Persons).
7. Yuri V. Trofimov, Valery S. Posedko, Vladimir K. Sivenkov, Alla S. Posedko, Institute of Electronics of the National Academy of Sciences of Republic of Belarus Minsk, Belorussia. Title of invention(s): Multifunctional display element.
8. A.V. Sadchikhin, S.B. Sozinov. AR Technology Co., Moscow, Russia. Title of invention(s): A way of excitation of a screen of a laser electron-beam tube.
9. Studentsov S.A., Brezhnev V.A., (all from Research & Development Institute VOLGA, Saratov), Simonenko G.V. (Saratov State University), Ezhov V.A. (Institute of General Physics of RAS, Moscow). Title of invention(s): Passive Matrix Liquid Crystal Screen and Method of its Driving.
10. I.I. Litvak, Moscow State Institute for Electronics and Mathematics (Technical University), Russia. Title of invention(s): The system of control of the computer user's safety.
11. V.A. Volodin, Moscow, Russia. Title of invention(s): Driving Method, Driving Device for Display, and Display (Variants).
12. V.Ya. Zyryanov, S.L. Smorgon, V.V. Presnyakov, V.F. Shabanov, L.V. Kirensky Institute of Physics, Krasnoyarsk. Title of invention(s): Electrically Controlled Scattering Polarizers Based on Uniaxially Oriented Films of Polymer Dispersed Cholesteric Liquid Crystals.
13. V.Ya. Zyryanov, S.L. Smorgon, V.F. Shabanov, L.V. Kirensky Institute of Physics, Krasnoyarsk. Title of invention(s): Polarizer-Free Light Modulators Based on Uniaxially Oriented Films of Polymer Dispersed Ferroelectric Liquid Crystals.
14. Gorfinkel B. I., Abanshin N. P., “Volga-Svet” Ltd., Saratov. Title of invention(s): FED operating with using of diamond-like planar-edge emitter.

REFEREES

(in alphabetic order)

Victor Belyaev, SID Russia Chapter

Valentin Borodin, Izobretatel i Ratsionalizator (Inventor & Inventor) Magazine, Russia

Valery Fedorkov, Ministry of Industry, Science and Technology of Russian Federation
(was absent)

Maxim Gorbachev, RO SPATENT *(was absent)*

Jyrki Kimmel, SID Mid-European Chapter, Finland

Valentina Kovalenko, Patent Attorney, Russia

Igor Kompanets, SID Russia Chapter

Alexander Smirnov, SID Belorussia Chapter

Kenneth Werner, Information Display Magazine, USA

ABSTRACTS OF THE APPLICATIONS

1. *Alexey Boroshnev (Cometa, Moscow)* presented a set of developments of a projection system on the base of small-size CRT and optically addressed spatial light modulators and different applications of such a system. This is an analog of ILA-technology developed in Hughes-JVC. In patents presented a design of the basic element is shown as well as systems of image transformation (color, spectrum, photolithography exposing from both sides of the substrates, big screen projection).
2. *Alexander Sadchikhin and Sergey Sozinov, AR Technology Co., Moscow,* described a new method of addressing of an electron beam onto a semiconductor target of a laser CRT (quantoscope). A prototype was chosen among the Platan CRTs. If the electron beam from the electron gun is ring-shaped with a definite ratio of the ring dimensions then the light generation in the target appears in an area with reduced size, i.e. the device resolution is improved. Such CRT can generate up to 3500 TV lines in a unit frame.
3. *Yuri Trofimov from Institute of Electronics, Minsk, Belorussia,* demonstrated a design and operating of a semiconductor opto-electronic element with functions of

both LED and photoreceiver. Two semiconductor layers are included into a positive feedback circuitry. When the current in the photosensible layer is over a threshold value the light generation in the LED appears. It is an opportunity of both remote writing and erasing of images.

4. *Sergey Studentsov, Volga, Saratov*, presented an improvement of well-known OMI-cell. The prototype has sharp voltage-transmittance curve but slow response. The inventors proposed to change the direction of the analyzer and a delay in the oscillogram appears which may result in unlimited increase in number of addressed lines of the LCD. The speed of response of the LC cell is also sufficient for TV addressing.

5. Invention by *Vitaly Volodin, Moscow* relates also to addressing methods of passive LCD. He proposed new method of evaluation of effective (rms) bias voltage in the LC layer by using a curve of its dynamic electrooptic response instead of the static one. It offers to calculate time diagrams of voltage to reduce transmittance in any non-selected pixels and increase transmittance in any selected pixel. The method has many advantages in comparison with known multi-line addressing schemes.

6. *Andrei Rybalochka, Institute of Semiconductor Physics, Kiev, Ukraine*, presented a new driving method for bistable LCDs with cholesteric LC. The prototypes of Kent Display Co., USA use sophisticated diagram of driving pulses sequence with seven levels of voltage. In two Ukrainian patents new two-level scheme is proposed which offers to simplify the circuitry, reduce response time and increase the contrast ratio.

7. The invention by *Grant Demirchoglyan and Victor Filippov, Institute of Physical Culture and Sports, Moscow*, relates to transformation of a visual image into a 2D distribution of electric pulses which are perceived by the human's skin. The goal of the invention is to provide blind and low-vision persons as well as operators with blocked visual channel with an auxiliary information channel. In image at the input of a photoreceivers matrix is transformed into a matrix of electric pulses on metal tips. Moving of big objects or variation of their scale is recognized easily.

8,9. *Victor Zyryanov, Institute of Physics, Krasnoyarsk* presented two applications of different LC devices made of polymer composites – polymer dispersed LC (PDLC). If a PDLC structure is stretched the pores become elongated. They scatter one polarization of a light beam and transmit the other. Such scattering polarizers do not absorb the light, which makes possible their use in projection systems. In other

invention a polymer dispersion of ferroelectric LC is created to reduce switch time of electrooptic response. Light efficiency of such shutter is improved because of absence of polarizers.

10. *Sergey Pasechnik, Moscow State Academy of Device Engineering and Information*, described new method of measurement of nematic LC viscosities. Three wedge-shaped cells are used with different boundary alignment of NLC.

11. Valentin Tsvetkov, Dolgoprudnyi, Moscow Region, proposed new concept of diffraction LCD with improved light efficiency. The design of the display does not include neither polarizers nor color filters. The color is created by diffraction on a grating of driving electrodes and its intensity is controlled by in-plane voltage. To form a disperse light beam a system of input masks is required. Black masks are also needed to absorb the zero diffraction order as well as intermediate colors.

12. *Alexander Ilyanok, Laboratory of Atomic and Molecular Engineering, Minsk, Belorussia*, suggested new quantum-size emitting element and invented a self-scanned flat display. A nano-structure material is positioned into a vacuum tube which has a couple of driving electrodes on internal surfaces. The electric field extracts electrons which are directed onto anode with a phosphor. The author suggests the structure can have unrestricted size with low energy consumption.

13. *Nickolai Abanshin and Boris Gorfinkel, Volga, Saratov*, presented new FED design with a diamond-like planar-wedge emitter. The electrons are extracted from the wedge of a CNT film, then are reflected from a metal mirror. They acquire high energy which excites the anode phosphor. The device functions as a vacuum triode which has a grid accelerating electrons. The authors suggest to create a new generation of low-voltage emitting displays which could replace even the LCD.

14. *Igor Litvak, Moscow Technical University of Electronics and Mathematics*, applied a system of PC user health protection which is programmed to switch off the PC when the user's fatigue is too high. The system takes into account the work complexity, age and health status of the user. It displays recommendations and warnings to the user.

The referees decided to award the following applications:

1st Award and \$1000 - Yuri Trofimov and co-authors

2nd Award and \$500 – Boris Gorfinkel and co-authors

3rd Award and \$250 – Andrey Rybalochka and co-authors