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19. Some structural and optical properties of thin and thick CdTe and Cd_xMn_{1-x}Te films / A.S. Opanasyuk, P.V. Koval, V.V. Kosyak, P.M. Fochuk, A.E. Bolotnikov, R.B. James // Proceedings of SPIE — 2012. — V. 8507. — P. 85071K-1 — 85071K-7.
20. Structural and sub-structural features of chemically deposited zinc oxide thin films / Zinc-oxide thin films / A.S. Opanasyuk, T.O. Berestok, P.M. Fochuk, A.E. Bolotnikov, R.B. James // Proceedings of SPIE. — 2013. — V. 8823. — P. 88230Q-1 — 88230Q-6.
21. Kurbatov, D. Injection and optical spectroscopy of localized states in II-VI semiconductor films / D. Kurbatov, A. Opanasyuk, H. Khlyap // Advanced Aspects of Spectroscopy. — Edited by Muhammad Akhyar Farrukh / InTech Published. — 538 p.

MULTICHANNEL SNIFF RECOGNIZER AND ITS THEIR CONCENTRATIONS

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Multichannel sniff recognizer (MSRC-1) is designed for rapid analysis and determination of odors concentrations. The database of the determined substances is approximately 100 agents (lubricants fuel, combustion of various materials, adhesives, alcohols, detergents, technical and perfume materials).

One of the most promising research directions in the development of micro-electronic converters proposed in the paper is the use of the dependence of reactive properties and negative resistance of semiconductor devices from the influence of external physical quantities, and the creation on this basis a new class of micro-electronic frequency converter of gas concentrations and recognition of odors. In devices of this type occurs a transformation of gas concentration, and other external influences into a frequency signal that allows you to create micro-electronic converters in the integrated technology and permits you to increase the speed, accuracy and sensitivity, to expand the range of measured values, to improve reliability, noise immunity and long-term stability of parameters.

The use of frequency as an informative parameter avoids the application of amplification devices, and analog-to-digital converters in the information processing, which reduces the cost of monitoring and control systems.

Multichannel sniff recognizer (MSRC-1) is designed for rapid analysis and determination of odors concentrations.

Ergonomics of the Device. The device has the following dimensions: 340×140×180 mm. Weight: 2.8 kg with battery. The size and weight of the device is intended as well for the work in the laboratory as in the «field» and fully meets the requirements for the portable equipment. Weight and autonomy of the device allows you to work in certain circumstances, for example, on the airfield, as well as in testing the aircraft in the shop, if you want to carry out multiple measurements while holding the device at arm's length at a height of more than 1,5 m.

The metal body provides shock resistance and protection of the device from external electromagnetic fields, and also provides radio and electromagnetic compatibility with aircraft equipment.

MSRC-1 meets the ability to connect to various network resources (such as network 220 V, and with the use of the battery). Power connector from 220 V European Standards, which is not diffi-



Fig. 1. Device MSRC-1 appearance



cult its connection. The instrument has a toggle of switch mode power supply and from the battery. Battery mode provides performance device for 2.5...3.0 h. On the instrument panel is mounted connector for the charger (battery 2.5...5.0 hours on the charger is a full battery charge indicator).

The size of the button «Power On» is standard and under this key are registered functions respectively on and off the device. Tuning the device is signaled by the LED.

The connection of the device to your computer (or laptop notebook) is provided via a standard USB connector (Type B).

There are the minimum number of buttons and connectors that provide its reliable operation. The operation with the device in work gloves technique in the «field» in such a systematic and structural solution is not difficult.

Hardware and software. The program of the USmellSense is easy in use and requires no special training and education. The program runs under various operating systems: Windows XP (SP1, SP2, SP3), Windows VISTA, Windows 7 (32 bit), Windows 7 (64 bit).

The drivers of connecting the device to a computer are supplied with the device and also as the program USmellSense are of original development. At the request of the customer with the instrument Vinni-sniff (MSRC-1) can be supplied the tablet computer.

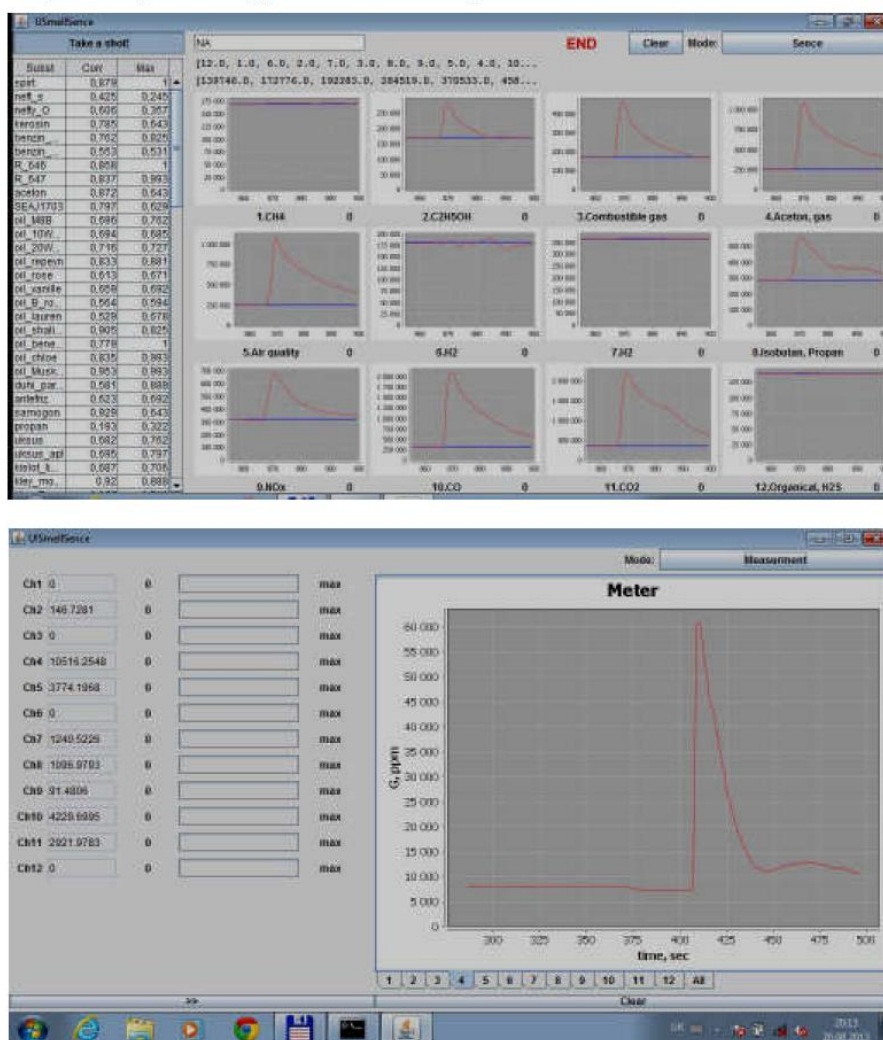


Fig.2. The program interface «USmellSense»

The database of the determined substances is approximately 100 agents (lubricants fuel, combustion of various materials, adhesives, alcohols, detergents, technical and perfume materials.)

The database is very easy to add with new substances; in the training mode is automatically generated a data file for recognition that in the future it is necessary to insert into the existing database file, it is also generated the graphic file, which shows the curves of frequency response of 12 sensors.

Vinni-sniff (MSRC-1) after the power is in the mode at 2,5...3,0 min., occurs the automatic selfcalibration and the speed selection of drawing air into the measurement chamber. The measurements are performed in real time, when the value of the informative parameter of at least one channel of more than 5 % the system starts automatically recognize the smell, after the 30 sec. is issued the recognition result with the correlation coefficient and the value of the concentration of the substance.

If in the database there is no data about the substance the device issues the data closed to the composition of a substance or it is written about the absence of the processed material in the database, and nevertheless the magnitude of the concentration of the substance is given at the output. By the speed of an informative signal from the sensors can be automatically changed the speed of the air being drawn into the measuring chamber.

Measurement. In multichannel resolver of odors and their concentrations (MSRC-1) are used microelectronic frequency converters of gas concentration and the volatiles with selectivity for gasoline, alcohol, acetone, combustible gases, hydrogen, carbon monoxide, carbon dioxide, nitrogen-containing fumes, organic vapors, hydrogen sulphide and air quality.

The device operates in real time.

Measuring range for various gas-containing compounds is from 2 ppb to 1500 ppm.

Measurement error in the range 2...500 ppb is 2 ppb;

in the range of 500...1500 ppb is 5 ppb;

in the range of 1,5...50 ppm is 0,5 ppm;

in the range of 50...1500 ppm is 5 ppm.

The concentrations of complex substances appears when certain substances in the detection cycle, as well as separately for sensors in the on-line

Repeatability in the determination of the substance is with the reliability of 0,91...0,98.

Documentation. Storing and reading of the measurement results as a file with the extension .txt and graphics .jpg in the program USmellSense. In the file with the extension .txt are recorded measurement results of 12 channels per second and the number of measurement points from the moment of turn-on the instrument. In the file with the extension .jpg screenshot of the screen is recorded with an increase in the signal on any of the 12 channels is greater than 5 %, which subsequently allows the expert to identify the substance if it was not made automatically, or in the absence of the substance in the database. Reading files from your hard disc, without problems, before the new measurements can delete individual files. If you accidentally deleted a file, it is not destroyed all the information stored on electronic media.

User Guide is written in accessible language and understandable to the user.

Mechanical properties. The metal body provides shock resistance and protection of the device from external electromagnetic fields, and also provides radio and electromagnetic compatibility with aircraft equipment.

Interval maintenance unit.

a) Calibration of the instrument

Initial calibration of sensors via the instrument is carried out at the manufacture of the device. Checking and re-calibration of sensors with intensive use held 1 time per year, with non-intensive use 1 every 2 years.

b) Replacement filters, sensors and other parts of the device 1 once every 3 years.