# **CONTENTS**

Telets V. A., Negina Yu. S., Orlov A. A. Manufacturing	
of 3D-MEMS by the Thermocompression Welding	

Three most used methods of the thermocompression welding for silicon wafers and other matelials applied in 3D-MEMS devices manufacturing are overviewed.

### 

Destination, design concepts, potentiality and key features of projection displays with the microoptoelectromechanical-systems (MOEMS) are discussed.

#### 

In article the technique of the control of damp inside IC packages with the help of the sensor in gauges. Necessity of the control of moisture content for improvement of quality and is shown reliability of issued production. The design of the gauge of a dew-point superficially.

# Evlyukhin A. B., Fadeeva I. Yu. Modeling of Image Formation in Scanning Near-Field Optical Microscopy of the Collection and Illumination Modes

Purpose of the investigation is to compare the images of the same sample obtained by numerical modeling of scanning near-field optical microscopy in collection and illumination configurations. Theoretical description is based on self-consistent integral equations for the electric field in the system. The cases when the nanoscale objects can be on and under the sample surface are considered. The results demonstrate the interaction between probe and the sample plays important role in the image formation process.

#### 

Influence of platinum doping on the electrical properties in temperature range of 20...400 °C in thin gas-sensitive films  $\rm SnO_2$  prepared by reactive sputtering of tin target has been investigated. The changes of concentration and mobility of charge carriers in dependence on platinum content from 0,5 to 3 % weight have been studied. It was determined that platinum introduction has led to increase of gas sensitivity and to decrease of temperature of higher sensitivity  $\rm SnO_2$  films towards ethanol and acetone vaporous in the air.

#### 

The bases of metrological security of the dimensions based on the methods or scanner probe microscopy and laser interferometer — phasemeter are represented. The methods and means of reproduction and transmission of the unit of length dimension in the indicated range with absolute binding to the state primary standard of the unit of length — the meter are offered; the technology is developed and

tree-dimensional micro-nanorelief of surface are created and also the algorithms and the package of programs permitting to realize the automatized tree-dimensional dimension of the condensed envirouments are created

#### 

At present time the various applications of the field emission cathodes in a vacuum devices are strongly investigated. Utilizing the field emission cathode provides developing of the new devices with promising parameters. This is the fact, that field emission cathodes made of carbon materials have good emission current stability under condition of sealed off electro vacuum devices. The construction of the cathodoluminescent light source with the field emission cathode made of carbon fibers is described. The characteristics of light sources is analyzed. It is shown, that possible application of the light source is large video screen and boards for outdoors using. The simple control system for video screen is described.

#### 

The most popular algorithms for calculating the fractal dimension of scanning probe microscopy (SPM) images were investigated. The algorithms were applied to simulated surfaces with know fractal dimension. The precision of the algorithms was examined. The most precise methods were determined.

#### 

Results of SNOM measurements analysis of a near-field structure of the semiconductor laser emission are presented. The achieved higher resolution makes it possible to observe thin inhomogeneities of near-field laser emission, which are likely related to nanoscale inhomogeneities of the emitting laser surface. The microscope resolution is determined by the size of the probe aperture (~50-100 nm), which is much smaller than the wavelength of light. It was possible to discern in SNOM laser emission images small, comparable to the probe size, inhomogeneities of structure, the true form and magnitude of which are inevitable smoothed over the scale of probe transfer function. To retrieve the true structure of near-field laser emission, the method of generalized discrepancy based on the Tikhonov's theory of ill-posed problems was used. To test this method, numerical modelling has been carried out and measurements results have been processed taking into account the probe transfer function determined from the test measurements with the etched vanadium film. Then, image deconvolution method is applied to retrieve images of the near-field emission of semiconductor laser distorted by the instrument transfer function influence. Using this approach, in the SNOM measurements small (3-4%) variations with a spatial size of about 50 nm have been discerned. The form of these inhomogeneities was similar with the form of the laser emitting surface relief measured simultaneously using atomic-force microscope.

## Подписку за рубежом принимают:

#### For foreign subscribers:

Joint-stock company MK-Periodica. E-mail: info@periodicals.ru; Tel.: +7(095) 284-5008. Fax: (+7) 281-3798

The journal bought since november 1999. Editor-in-Chief Ph. D. Petr P. Maltsev

ISSN 1684-6419.

Address is: 4, Stromynsky Lane, Moscow, 107076, Russia. Tel./Fax: +7(095) 269-5510.

E-mail: it@novtex.ru; http://www.microsystems.ru