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Brno University of Technology, Faculty of Electrical Engineering and Communication, Physics Department

(L. Grmela, P. Tománek).....271

The paper shortly overviews a history and describes recent activities of the Physics department of the Faculty of Electrical Engineering and Communication, Brno University of Technology. The increasing role of the department in education as well as in basic and applied research of novel technologies in Electronics, Optoelectronics, and Nanotechnology is mainly stressed.

RTS noise in MOSFETs (J. Pavelka, J. Šikula, M. Tacano, M. Toita).....273

Low-frequency noise in MOSFETs is given mainly by $1/f$ -like noise and RTS (random telegraph signal) noise components, generated by charge carriers capture and emission by traps near channel. In this paper experimental results on RTS noise amplitude and mean capture and emission times are analysed as a function of applied bias and temperature and traps characteristics, such as activation energy and their position in channel are estimated.

Keywords: RTS noise, $1/f$ noise, MOSFET, traps

Measurement of solar cell surface for microplasma discharges presence acknowledgement in the PN junction structure (O. Krčál).....280

The microplasma discharges in the PN junction local defect regions are as a rule, accompanied by the emission of light. This radiation from solar cell PN junctions was measured by means of an optical fiber connected to the optical input of a photomultiplier. By inching the fiber by means of computer controlled X-Y plotter above the cell surface a 2-D image of the irradiation local regions has been created. It is seen that a cell of a superficial area of 100 square cm contains a large number of defects, which depends on applied reverse voltage. This method can be a convenient tool for study and diagnostics of optoelectronic devices. The main thesis goal is to uncover the radiation features as spectrum and voltage dependency. The occasion of emission generation will be determined.

Keywords: solar cell, PN junction, avalanche breakdown, light emission

Optical methods for electric quantities measurement in pulsed power applications (P. Drexler, P. Fiala).....282

The principles of optical methods which are suitable for measurement of electric quantities in pulsed power systems are presented. The utilization of these methods considers extreme parameters of the quantities in the meaning of the top value and time duration. The methods exploit electro-optic effect for the pulsed high-voltage measurement and magneto-optic effect for the pulsed current measurement. The principle of electro-optic effect is described by means of tensor calculus together with the Jones calculus. The principle description of magneto-optic effect utilizes a simple model of harmonic electron oscillator as a part of optical medium. The Jones calculus analysis follows then. The advantages of dual orthogonal polarimetry method for evaluation of optical signal are presented and the basic analytic description is given. The dual orthogonal polarimetry method is demonstrated on the model application of pulsed current measurement.

Keywords: Electro-optic effect, magneto-optic effect, linear birefringence, circular birefringence, polarimetry, pulsed power systems, Jones calculus

SSilicon solar cells pn junction geometry and location assessment using CU characteristic measurement

(R. Macků, P. Koptavý).....291

This paper briefly deals with the determination of the solar cells n^+p junction exact position. A consideration of this position should be very important for the interpretation of experimental characteristics with non-standard behaviour as a probable consequence of pn junction area reduction or its enlargement. For the analysis the method based on the simulation of diffusion process and the n^+ emitter concentration profile has been used. The position of pn junction follows from the analysis and we show that the effective area of the pn junction does not vary critically.

Keywords: Solar cell, CU characteristics, depletion approximation, effective area

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Correlation between optical and electrical properties of solar cells (P. Paračka, P. Koptavý, A. Knápek).....296

The correlation between optical and electrical properties of solar cells was studied in this paper. Microplasma noise appears in solar cells when there is certain bias voltage applied to the junction which is less than breakdown voltage of the whole nondefect area of the junction. This effect can be accompanied with radiation emission from local areas of PN junction. The aim of the study is to verify that microplasma noise (electrical signal) induces radiation emission (optical signal).

Keywords: PN junction, microplasma noise, solar cells, defects.

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ANOTACE

Měření a teoretické aproximace VA charakteristik MOSFET (M. Chvátal, V. Sedláková, J. Šikula, A. Knápek).....278

Článek se zabývá transportem nosičů náboje v kanálu tranzistoru typu MOSFET za předpokladu, že pohyblivost elektronů nezávisí na intenzitě podélného elektrického pole, určeného napětím na kolektoru a koncentrací elektronů v kanálu je exponenciální funkcí rozdílového napětí mezi elektrodou hradla a křemíkového substrátu. V tomto případě je celkový proud složen z proudu driftového a difuzního a je určen poměr mezi oběma složkami. Za těchto předpokladů je odvozeno rozdělení koncentrace nosičů a závislost napětí na poloze v kanálu.

Klíčová slova: VA charakteristika, MOSFET, koncentrace elektronů, difuzní proud, driftový proud