Poster Session:

Chairman: St. Lutherdt, F. Roß (DE-Ilmenau)

S. Linß, I. Gavrilova, V. Unger, T. Kikova, H. Witte, L. Zentner (DE-Ilmenau)

Development of an Adaptive Support Device for the Prevention of Bedsores

Constant long-time compression of the skin may cause bedsores especially in case of immobile hospital patients or bedridden people. Even with optimal quality of care painful skin lesions can occur that range from simple reddened skin to open pressure ulcers. The high prevalence figures and the associated economic, ecological and social effects indicate the need of improved prevention systems. Therefore, an approach on the development of an adaptive support device to prevent bedsores is presented in this paper. A supporting evaluation of the pressure ulcer risk can be provided by the determination of the load situation acting on the skin as well as other factors of the microclimate. For the bionic development process the human skin with her special three-dimensional geometry of the boarding surfaces of the layers as well as the distribution of biological sensors and actuators is particularly interesting as the source of inspiration for the technical implementation. The analysis of the state of the art and the consideration of abstracted biological principles result in a demonstrator from silicone, which can be used for the investigation of basic functions of support systems. Furthermore the realization of new properties, like an optimal distribution of pressure and a minimization of shear forces, can be realized by the layered compliant structure. With the integrated sensor and actuator technologies an efficient adjustment of the stiffness and therewith of the sensitivity is possible too. The system to be developed enables the detection of critical pressure values as well as the dedicated stimulation of susceptible skin areas and it can be used in a system for pressure ulcer prevention.

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Light-emitting diode modules of small size for the phototherapy devices

LIGHT-EMITTING DIODE MODULES OF SMALL SIZE FOR THE PHOTOTHERAPY DEVICES I. Vrublevsky, A. Tuchkovsky, K. Chernyakova Belarusian State University of Informatics and Radioelectronics, Minsk, P. Brovka Str., 6, Belarus, 220013, e-mail: vrublevsky@bsuir.edu.by Light-emitting diode (LED) module developed for the phototherapy devices is intended for the preventive measures and treatment of the rhinitis by the blue light waves of the low-energy and narrow-beam. Power blue light wave emitting by LED has the phototherapeutic effect and in the first place is destined to the irradiation of Schneiderian membrane of the patient. It is well known that waves of the blue range possess the antimicrobic action. To fabricate LED module of small size heat-conducting aluminum substrate with nanoporous anodic alumina with the extra heat sink (the heat tube made of copper) has been used in the present study. The structure of LED module developed allowed increasing the efficiency

of the heat removal and decreasing the temperature of operation of LED's die considerably. To mount a super-bright LED the aluminum substrate with nanoporous anodic alumina of 20 mm diameter has been utilized. LED's performances: 1 V power, 440 nm wavelength, focusing lens of 60°. The layer of anodic alumina of 75 μm thickness has been used as an insulator. Anodic alumina has been obtained in the aqueous solution of oxalic acid by the electrochemical anodization of aluminum. Anodic oxide was absent on the one side of the circuit board in order to increase the heat-conductivity. Vanadium-copper films have been used to form conductivity plane. Vanadium sublayer has been formed by the vacuum evaporation. The deposition of copper layer has been carried out by the galvanic method. Immersion tin has been applied to solder the contact pads. The photometric characteristics of the LED module have been determined. The LED module is shown to allow obtaining the illumination of 30,000 lux at the distance of 3 cm.