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EXPERIMENTS WITH RADFET DOSIMETER IN ELECTRON-BEAMS IRRADIATION AND NUMERICAL COMPUTATION OF THE PHYSICAL SHIELDING FACTOR

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MOSFET electronic components are already the subject of several decades of research in various fields of dosimetry and radiation protection. Special interest appeared when these components are started to be used as dosimeters in radiotherapy with electron beams. However, if one looks much more serious in the wider scientific research horizon, all the results obtained in experiments with precisely defined energies of incident electrons can be used in other disciplines which consider the impacts spectra of cosmic radiation on electronic devices, which is especially importance for cosmic science and space research instrumentation. In this paper, one of the objectives was to examine the electrical characteristics specially designed ESAPMOS RADFET dosimeters in the experiments that were conducted on a linear accelerator installations. RADFET components are bombarded electron beams energy of 6 MeV and 8 MeV, and then are followed by changes in threshold voltage shift mean values depending on the change of absorbed dose is referred to as D(cGy) was determined in water. Conclusions performance RADFET components are more than encouraging in terms of further research to improve the linearity of the energy dependence as widely energy electrons. In the second part of the test complex structure of packaging components RADFET focus is placed on the determination of the energy deposited in layers that are of interest for the analysis of microscopic processes related to the recombination of radiation-induced electron-hole pairs. Transport incident electrons through all the layers of structure RADFET component type ESAPMOS was carried out numerical simulations of the Monte Carlo method using the software package FOTELP-2K12. On this occasion, were taken into account all the physical processes of interaction of electrons with materials given structure. When he conquered the numerical application of mathematical and physical model for determining the value of the absorbed energy as the energy deposited per unit mass in a given layers with different materials, it could be accessed defining physical shielding factor (PSF) for a given structure RADFET components. Physical shielding factor (PSF) is defined as the ratio of absorbed dose values, which in fact means that it is equal to the energy deposited when the RADFET is shielded with protection, and the RADFET without lid. When we know the energy dependence factor for PSF of RADFET with and without armour, can be carried out and the analysis of whether and to what extent the energy required compensating the electronic components. Monte Carlo simulations were performed for the transport of incident electrons from 4 MeV, 6 MeV, 8 MeV and 12 MeV. It can be concluded that the different energy of incident electrons there is a significant influence of material Kovar on the absorbed energy in SiO_2 and Si layers structure RADFET, in cases where Kovar used among other things as physical protection.