AbstractID: 9665 Title: Characterization of semiconductor detectors for fast neutron beam dosimetry

The aim of this study was to implement custom designed miniature p-i-n diodes for dosimetry of d(48.5)+Be fast neutron beam produced in super conducting cyclotron. A readout circuit box was developed and used for high-resolution measurements of the change in the voltage drop caused by the increase in the resistance of the p-n junction due to the neutron damage. On-line monitoring of the target current simultaneously with the voltage drop was available using dedicated Lookout ® software. Two types of diodes were investigated: D-type with a sensitive volume of about 1 mm^3 and C-type, a planar diode of 0.5 mm diameter sensitive volume. The diodes were calibrated in 10x10 cm^2 field at 5 cm depth in water. The neutron and gamma components at this location were predetermined using twin detector method. The sensitivity of the diode at 1 mA injection current expressed, as voltage drop was 1.27 and 0.90 mV/cGy of neutrons for D and C diodes, respectively. The sensitivity of C diode increased to 3.62 mV/cGy of neutrons when the injection current was increased to 8 mA. The neutron dose measured at various depths on the central, as well as on the lateral beam profile demonstrated an agreement with the results obtained by paired detector method at the same locations within 7%. Measurements in the build-up region in A-150 phantom were performed with the C-type diode. Contrary to the results obtained with the extrapolation chamber, no build-up was observed in these measurements.