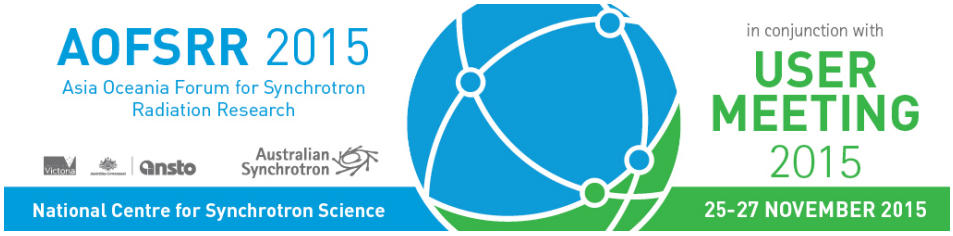

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Characterization of a novel 3D silicon strip detector for Microbeam Radiation Therapy (MRT) quality assurance

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Microbeam Radiation Therapy (MRT) is a promising radiotherapy modality that uses arrays of spatially fractionated micrometre sized beams of synchrotron radiation to irradiate tumours. A typical MRT radiation field consists of an array of microbeams, each with a FWHM of 50 μm and a pitch of 200 μm. The small field size and the steep dose gradient at the peaks poses a challenge for dosimetry due to the required spatial resolution of 1 micrometer. Use of silicon detectors in an edge-on configuration has been investigated as a way to increase spatial resolution [1] but this introduces a non-water equivalent response due to interactions in the silicon surrounding the sensitive volume. The Centre for Medical Radiation Physics (CMRP), University of Wollongong (UOW), and collaborators have produced two configurations of novel silicon single strip detector (SSD) aiming to improve tissue equivalency of the detector. It has been achieved by fabrication the 3D MESA sensitive volume of SSD erected on top of SiO2 by etching away silicon surrounding the sensitive volume. Detector Topology was examined using a scanning electron microscope at the Australian Institute of Innovative Materials (AIIM). Electrical characterization of the detector was accomplished using I-V and C-V measurements. Preirradiation to stabilize radiation response of the 3D SSD followed by acquisition of microbeam dose profiles were performed at the Autralian Synchrotron's Imaging and Medical Beamline (IMBL) using CMRP's X-Tream dosimetry system [2]. Electrical characteristics, topology, and microbeam dose profiles will be presented in this poster.

Keywords

MRT

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