

AbstractID: 2058 Title: Physics Characterization of micro-MOSFET Detectors for Use in CT Dosimetry

The purpose of this study was to evaluate physics characteristics of μ -MOSFET detectors (TN-2002RDM, Thomson-Nielson, Ottawa, Canada) in CT dosimetry. We reported results of high sensitivity (HS) MOSFET (TN-2002RD) dosimeters at the 2003 AAPM meeting. The beam quality (HVL 7.24 mm Al) for GE CT scanners (GE Medical Systems, Milwaukee, WI) was obtained by adding copper filters (0.2 mm thickness) to a conventional radiographic x-ray unit. All x-ray calibrations were performed with an ion chamber (model 10x5-6) and Radiation Monitor (model 9015, Radcal, Monrovia, CA). We evaluated μ -MOSFET for sensitivity, linearity, energy dependence, post-exposure response, lower limit of detection, and sensitivity variations to two types of detector holders (acrylic and tissue equivalent). The average sensitivity ranged from 31 to 34 mV/cGy for μ -MOSFET and 25-27 mV/cGy for HS MOSFET at 140 kVp. The linearity of dosimeters was tested from 0.5 cGy to 2.0 cGy; the goodness of fit was 0.9999. The energy dependence was studied: μ -MOSFET showed higher sensitivity than HS MOSFET by 32% (100 kVp), 31% (120 kVp), and 20 % (140 kVp). The post-exposure response by single query remained constant for all practical purposes. The lower limit of detection was 0.15 cGy at 25% uncertainty at the 68% CL. No sensitivity differences were observed between tissue equivalent holder (CIRS, Norfolk, VA) and acrylic rod holder. We conclude that μ -MOSFET characteristics are basically equivalent to HS MOSFET except slightly higher sensitivity was seen in μ -MOSFET; however, for clinical CT dosimetry this small gain in sensitivity may be marginal.