

AbstractID: 3609 Title: Evaluation of MicroMOSFET Dosimeter For Low Dose Measurement of I-125 Seed

Purpose:

MicroMOSFET detectors have been used in dose measurement for high dose rate brachytherapy sources. In terms of dose characterization for low dose rate seeds, we report our study of using microMOSFET detector for radial dose measurement of ^{125}I seed in solid water phantom, for low doses down to 1cGy at distances out to 6cm.

Method and Materials:

Two high sensitivity microMOSFET detectors (Thomson-Nielsen model TN1002RDM, 1mm wide, 0.9mm thick) were positioned at discrete points along the transverse axis of a ^{125}I seed (Implant Sciences model 3500) of air kerma strength (NIST traceable) of 6U in a solid water phantom (RMI model 457, 30 x 30 x 20 cm³). One detector was below the seed at 6.115cm for 21 hours. The second detector was above the seed at 0.985, 1.985, 2.985 and 3.985cm for 1.5, 2, 4 and 13.4 hours, respectively. The estimated dose rates ranged from 6.2 down to 0.05 cGy h⁻¹ and accumulated doses ranged from 9.3 down to 1cGy, at 0.985 and 6.115cm, respectively. The signals were read using a mobileMOSFET system with high bias voltage setting. The reading (mV) for 0.985cm distance was used to calibrate the MOSFET sensitivity in mV/cGy, based on the dose value (cGy) calculated using the TG43U1 recommended parameters.

Results:

The microMOSFET sensitivity was 32.4 mV/cGy. The dose rates in cGyh⁻¹ were determined at the measurement distances. The specific dose rates in cGyU⁻¹h⁻¹ were compared with those generated from TG43U1 recommended parameters. General agreement is observed.

Conclusion:

The high sensitivity microMOSFET dosimeter with high bias voltage is suitable for ^{125}I seed low dose measurements with dose rates as low as 0.05 cGy h⁻¹. It is promising for characterization of low dose rate seeds, and for in-vivo dose monitoring during ^{125}I seed interstitial implants.

Conflict of Interest

Free ^{125}I seed from Implant Sciences Corporation.