

AbstractID: 6442 Title: Effect of the added buildup on p-type silicon diodes" response in daily *in vivo* dosimetry measurements

The silicon semiconductor diodes used for routine *in vivo* dosimetry in radiation therapy are commonly constructed with added buildup to place the effective point of measurement (location of the silicon chip) at the depth of maximum dose (d_{\max}) or beyond and to shield against low energy scattered photons. This added buildup, commonly made of high-density metals, could however introduce increased uncertainty to the accuracy of diode measurements. Previous work in this area has shown that buildup diodes show certain imperfections when applied in small photon fields.¹

We have studied the effect of this buildup on *in vivo* dosimetry measurements, especially for small-field dosimetry associated with IMRT treatments. We compared the response of the buildup diodes to that of no-buildup ones, commonly referred to as skin diodes. We have used identical commercially available p-type diodes, with and without the additional buildup, to measure the dose delivered by small static fields. The measurements with the no-buildup diode were performed by placing tissue-equivalent bolus on top of the diode to bring the diode measurement point to the depth of D_{\max} . In addition, we measured the dose to sample IMRT phantom plans as well as patient IMRT plans delivered to phantom, using both types of diodes.

Our results indicate that the buildup diodes, in general, produce higher readings than no-buildup ones for small field dose deliveries, adding to the uncertainty of diode measurements. We have also observed that using the skin (no-buildup) diodes with added tissue-equivalent buildup decreases the measured-to-expected percentage differences by about 2%.

¹ Griessbach et al., "Dosimetric characteristics of a new unshielded silicon diode and its application in clinical photon and electron beams", *Med. Phys.* 32: 3750-3754, 2005