AbstractID: 4476 Title: Experimental Evaluation of a MOSFET dosimeter for Therapeutic Proton Beams

Purpose: Metal oxide-silicon semiconductor field effect transistor (MOSFET) dosimeter has been widely studied to use a dosimeter for patient dose verification. The major advantage of this detector is its size, which acts as a point dosimeter and also its ease of use. Here, the MOSFET dosimeter has not ever used for proton dosimetry. Of course, it is important for proton radiotherapy to evaluate proton dose distributions accurately in the body. Therefore, in order to measure proton dose distributions in heterogeneities and small fields, we used a MOSFET dosimeter for the first time in proton dosimetry. In this study, we evaluated the characterization of the MOSFET dosimetry for therapeutic proton beams.

Method and Materials: A commercially available TN502RD MOSFET System (Thomson & Nielsen, Canada) was used in the study. Proton beams with 190 MeV were irradiated at National Cancer Center East in Japan. We evaluated dose reproducibility, linearity and fading effect at high sensitivity bias. Then, depth dose distributions for mono-energetic and spread-out Bragg peak proton beams were measured using the MOSFET dosimetry. All measurements were performed in solid phantom.

Results: The MOSFET was characterized for dose reproducibility, linearity and fading effect. The dose reproducibility was ± 2.0%. The MOSFET response was linear with dose within ±1.0 mV. We observed fading effect of about 2.0% in 15 minutes. In depth-dose measurements, the MOSFET response depended strongly on proton energy. Bragg peak obtained by the MOSFET were estimated to be about 40 % lower than those of ionization chamber.

Conclusion: We found that the MOSFET has stopping power dependence for proton beams. It is hard for clinical application to use the MOSFET dosimeter. We need to improve proton energy dependence for the MOSFET dosimeter