

AbstractID: 6828 Title: Evaluation of a commercial OSL system for dosimetry measurements in radiotherapy beams

Purpose: To evaluate feasibility of using a commercial OSL reader for in-vivo dosimetry in radiotherapy.

Method and Materials: A commercial OSL system developed by Landauer Inc., the InLight microstar reader, was tested for dosimetry procedures in radiotherapy. The system uses $\text{Al}_2\text{O}_3:\text{C}$ in the form of "dots" as the radiation detector material. Experiments were carried out in ^{60}Co , 6, 10 and 18 MV photon beams. A solid water phantom, 30x30 cm, with a special groove to accommodate the dot detector was used. The OSL dots were calibrated against an NE2571 ionization chamber. Some of the measurements were compared with data acquired using other radiation detectors, such as ionization chambers, diodes and MOSFETs.

Results: The detector response to accumulated dose is linear from 20 to 400 cGy. The fading of the detector signal was less than 2% over a one month period. The detector response is independent of energy between 6 and 18 MV however is higher by about 2% in a ^{60}Co beam. A PDD curve for ^{60}Co was measured in a solid water phantom for 10x10 cm^2 field size at SSD=80cm. The data were compared with the ionization chamber measurements in the same phantom and with diode measurements in water and found to be in very good agreement. The relative output factors were measured for field sizes ranging from 5x5 to 25x25 cm^2 and are in very good agreement with the measurements performed using an ionization chamber.

Conclusion: OSL results agree well with ionization chamber, diode and MOSFET measurements carried out under the same conditions, indicating suitability of the Landauer OSL system for radiotherapy dosimetry.

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