

AbstractID: 11028 Title: Optically Stimulated Luminescence Detectors (OSLDs) applied to proton therapy beam dosimetry

**Purpose:** To characterize optically stimulated luminescence dosimeters (OSLDs) for point measurement in proton therapy and one-dimensional dose profiles of proton scanning beams.

**Method and Materials:** Irradiations were carried out at the M. D. Anderson Proton Therapy Center in different conditions: (a) irradiation in air with proton energies from 100 – 250 MeV; (b) irradiations at various depth in water for a pristine Bragg peak; (c) irradiations at various depths in water for a Spread Out Bragg Peak (SOBP); (d) irradiation with pencil beam to determine the lateral profile. The OSLDs were prepared from commercially available OSL tapes (Luxel™, Landauer Inc.) in the form of single OSLD (7 in diameter by 0.3 mm thickness) or OSL strips (4 mm width by 150 mm length by 0.3 mm thickness). TLD-100 dosimeters were also used for comparison. The OSLDs and TLDs were read using a Risø TL/OSL reader (Risø National Laboratory, Denmark) and an InLight™ microStar reader (Landauer Inc.). The OSL strips were read using a custom-made OSL strip reader.

**Results:** The energy dependence of the OSLDs was within  $\pm 1\%$  for irradiations free-in-air with energies in the 100-250 MeV range. For OSLDs readout using the Risø reader, the experimental standard deviations were  $\sim 1.6\%$  of the mean value. Measurements in the pristine Bragg peaks showed a reduction in efficiency at the end of the proton range, the effect being higher as the incident proton energy decreases. Finally, the comparison between the spot scanning beam profile measured using ionization chamber and OSL strip detectors showed the potential of the technique for this application.

**Conclusion:** The results demonstrate the OSLDs performance for proton therapy and indicate the potential use of OSLD strips for determination of proton beam profiles.

**Conflict of Interest:** One of the authors (E. G. Yukihiro) is supported by a Landauer Inc. grant.