

AbstractID: 7151 Title: Dose Response of CaF₂:Tm to Charged Particles of Different LET

Thermoluminescent dosimeters (TLDs) are well established for performing calibrations in radiotherapy and for monitoring dose to personnel exposed to low linear energy transfer (LET) ionizing radiation. Patients undergoing light ion therapy and astronauts engaged in space flight are, however, exposed to radiation fields consisting of a mix of high LET charged particles. In this study, glow curves from CaF₂:Tm chips were examined after exposure to various electron and ion beams. The annealing and readout procedures for these chips were optimized for these beams. After a 10 minute pre-readout anneal at 100°C, the optimized glow curve samples the light output between 95 and 335°C with a heating rate of 2°/s. The ratio of the integral of the glow curve under peaks 4, 5, and 6 to the integral under peak 3 was approximately 0.9 for electrons, 1.1 for entrance protons, 2.1 for peak protons, and 2.2 for entrance carbon, silicon, and iron ions. The integral light output per unit dose in water for the iron exposures was about half as much as for the electron exposures. The peak area ratio may be useful for determining both a quality factor and dose response factor.