

AbstractID: 11215 Title: The influence of readout parameters on the TL dose response of TLD-100

Purpose:

To investigate the influence of TLD-100 readout parameters including maximum readout temperature and heating rate for different doses.

Method and Materials:

The influence of readout parameters on the response of LiF:Mg,Ti (TLD-100) chips was investigated by using different maximum readout temperatures and heating rates. TLDs were irradiated to doses to water ranging from 10cGy to 1000cCy with ⁶⁰Co. The maximum readout temperatures ranged from 240°C to 380°C with the heating rate set at 15°C/s. For the 350°C maximum temperature, heating rates of 2°C/s to 30°C/s were investigated.

Results:

When the maximum temperature is set to 240°C, an incomplete glow curve is seen with more residual signal in the TLDs and relatively low TL dose response. When the maximum readout temperature is as high as 380°C, the higher temperature peaks (peak 6, 7) can affect the integral TL emission. However, if only the height of peak 5 is used, the response-dose curves are quite similar for maximum readout temperatures between 260°C and 380°C. Different heating rates from 2°C/s to 30°C/s were used to heat the TLDs to 350°C, with the same holding time after reaching the maximum readout temperature. The results show that different heating rates do not appreciably change the TL dose response when the heating rate is higher than 5°C/s. However, the signal to noise ratio decreases noticeably when the heating rate is lower than 5°C/s especially at low doses. The glow peak temperature shifts upward with increasing heating rate, which means a higher maximum readout temperature is required to obtain the full glow curve.

Conclusions:

Integral TL response is strongly dependent on maximum readout temperature, so care must be used in choosing and documenting this temperature. Heating rate may also affect the readout uncertainly, especially at low doses.