

TL and OSL Technology

Luminescence dosimetry is a well-established method for measuring radiation doses. It uses luminescent materials in which charge carriers are excited to elevated metastable states by ionising radiation. They stay in these states until stimulated by heat (thermally) or light (optically), which releases them and causes them to return to their ground state, emitting light in the process. The intensity of the light emitted is proportional to the absorbed radiation dose.

Dosilab's personal dosimeters use two different technologies: Thermoluminescence (TL) and optically stimulated luminescence (OSL), each named according to their respective measurement techniques. Each personal dosimeter consists of four crystalline absorbers:

- The TL dosimeters (TLD) each contain two $\text{Li}_2\text{B}_4\text{O}_7:\text{Cu}$ and two $\text{CaSO}_4:\text{Tm}$ absorbers. The absorbers are heated to up to 400°C with short infrared flashes.
- The OSL dosimeters (OSLD) are made up of four sintered beryllium oxide ceramic components. Blue light with precisely defined power and pulse duration is used to read out the deposited dose.

The dosimeter contains four absorbers, each placed behind a distinct filter. By analysing the measurement signals from the individual absorbers and comparing them, the average deposited energy can be estimated. Additionally, it enables differentiation between various types of radiation, such as photons and beta particles, allowing for precise measurement of the radiation dose.

All measured data are continuously stored in a secure database to enable retrospective analysis at any time. Following data analysis, the dosimeter is reset by returning all charge carriers to their ground state, making it ready for reuse.

Dosimeters for measuring extremity doses (ring dosimeters) or eye lens doses use the same technologies but are significantly smaller than personal dosimeters and therefore contain fewer detectors.

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