AIM: (a) to understand the isothermal technique and the various heating rate method for the calculation of activation energy (E) and frequency factor (s) and (b) to calculate the E, s parameters for all peaks of TLD 100 or natural salt.

Materials: Lithium fluoride (TLD 100, LiF:Mg,Ti) or natural salt

PROTOCOL:

Step 1. Irradiation (0.5 Gy for synthetic materials, 15 Gy for natural materials)

Step 2. TL measurement (350 °C for synthetic materials, 500 °C for natural materials, HR=1°C/s)

Step 3. Identify each glow peak, the T_{mi} and I_{mi} of each one as well as the isothermal TL measurement temperatures T_i, in steps of 5 °C.

Step 4. Irradiation (0.5 Gy for synthetic materials, 15 Gy for natural materials)

Step 5. TL measurement (T_i °C, HR=1°C/s)

Step 6. Isothermal TL measurement (T_i °C, HR=1°C/s, 100 s)

Step 7. Residual TL measurement (350 °C for synthetic materials, 500 °C for natural materials, HR=1°C/s)

Step 8. Repeat steps 4-7 for increasing isothermal measurements temperatures T_i in steps of 5°C/s up to the T_{mi}.

Step 9. TL measurement (350 °C for synthetic materials, 500 °C for natural materials, HR=1°C/s) without any irradiation for background

Step 10. Irradiation (0.5 Gy for synthetic materials, 15 Gy for natural materials)

Step 11. TL measurement (350 °C for synthetic materials, 500 °C for natural materials, HR=1°C/s)

Step 12. Repeat steps 10-11 for increasing heating rates, namely 2, 4, 5, 8, 10, 15 °C/s

Analysis:

1. Calculate the E, s according to the both techniques
2. Calculate the lifetime of each trap if possible.

NOTE. Due to the presence of many overlapping peaks, you can focus only to the 2 most intense TL peaks.

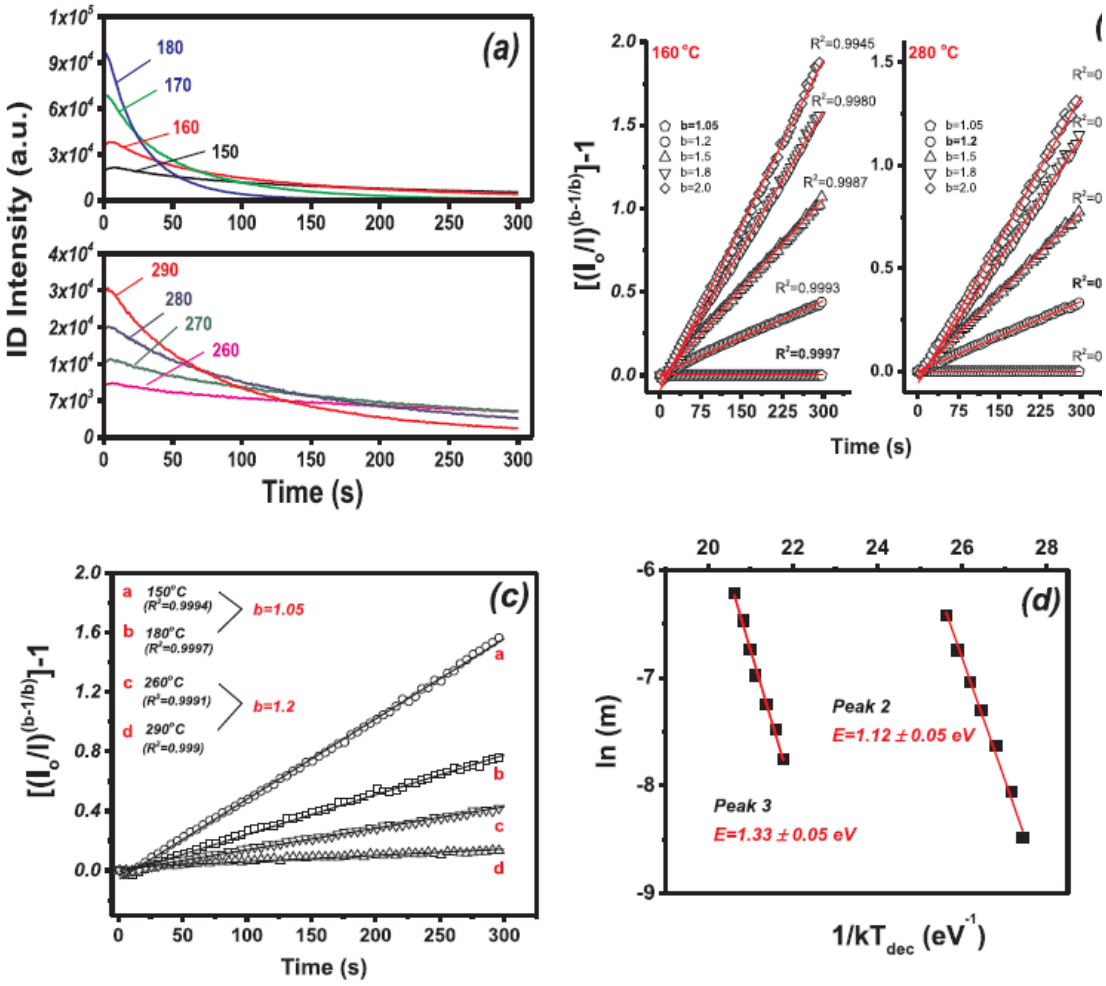

Fig. 1. Measurement and analysis for the isothermal TL technique.

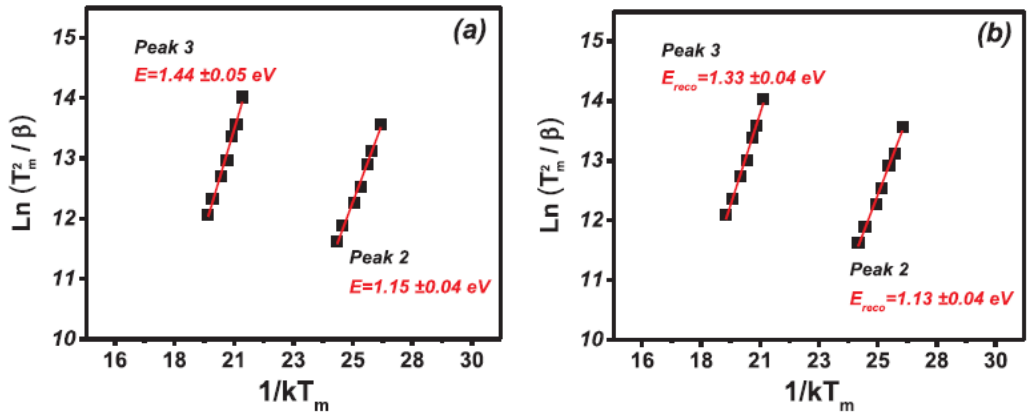

Fig. 2. Analysis in the framework of the various heating rates method for the two dosimetric TL peaks of BeO.