AIM: (a) to understand the effect of athermal fading, (b) to study the effect in a reference material that yields strong athermal fading and (c) check whether the effect could be attributed to tunneling recombination.

Materials: Durango apatite

PROTOCOL:

Step 0: Test Dose and sebsequent TL measurement to obtain the initial sensitivity (500 °C, HR=1°C/s).

Step 1: Irradiation

Step 2: Storage in dark for duration ti=0 min.

Step 4: Remnant TL measurement up to 500 °C.

Step 5: Repeat steps 1-4 for 12 different storage (waiting) times ti, ranging up to 300 minutes (5, 15, 30, 45, 60, 75, 90, 120, 150, and 300 min.

Step 6: As in step 0, in order to obtain the final sensitivity.

Analysis:

1. Check for each measurement the Tm of the maximum intensity
2. Plot Im and Integrated Peak intensity versus storage time ti
3. Calculate the athermal fading percentage over decade, g, via fitting using the following equation.
4. Comment on the fitting analysis.

$$\frac{L}{L_0} = 1 - \frac{g}{100} \cdot log_{10} \frac{t}{t_0},$$

where L_0 stands as the first (prompt) measured luminescence signal at zero time, t_0 after the end of irradiation and L the signal versus storage time t.

Reference: G. S. Polymeris, N. Tsirliganis, Z. Loukou, G. Kitis. "A comparative study of the anomalous fading effects of TL and OSL signals of Durango Apatite". Physica Status Solidi (a) 203 (3), 578 – 590, 2006.

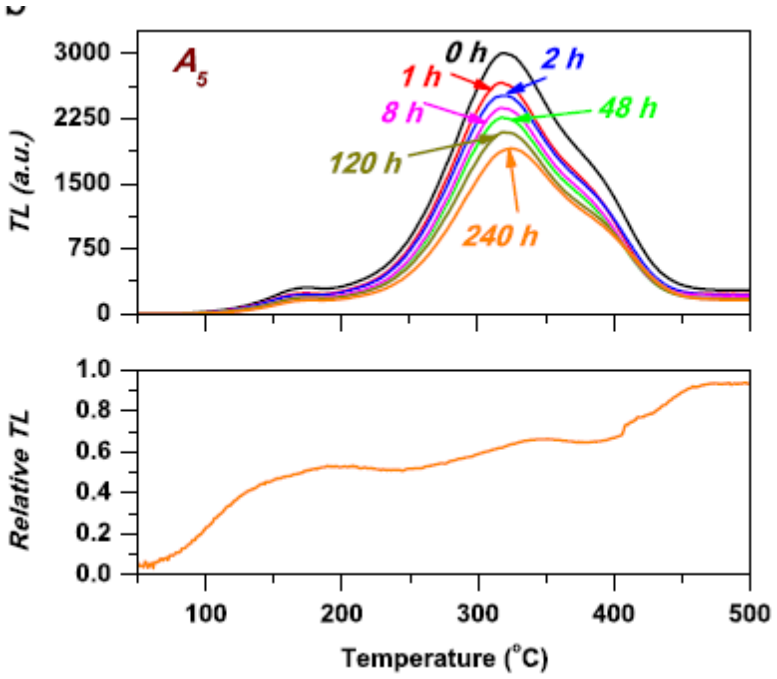

Fig. 1. TL glow curves after various storage times for Durango apatite

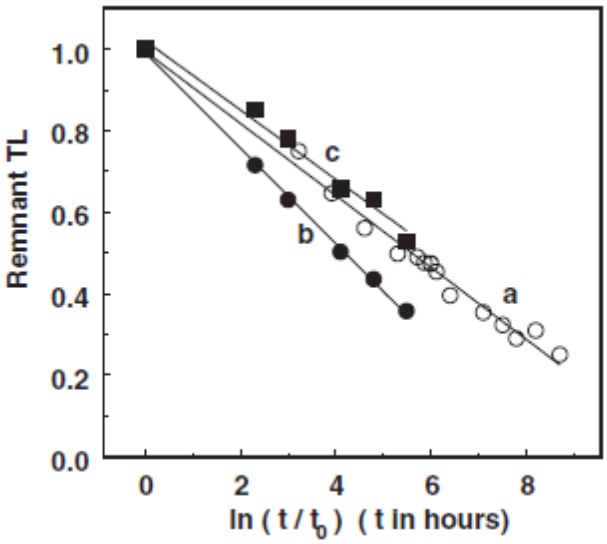

Fig. 2. Remnant TL versus various storage times for Durango apatite.