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Influence of duration of annealing on thermoluminescence of natural quartz annealed at 1000 °C

The influence of duration of annealing on thermoluminescence of natural quartz annealed at 1000 °C is reported. The study looks at samples annealed for 10 and 60 minutes. A glow curve measured at 1 °Cs⁻¹ after beta irradiation to 50 Gy for the sample annealed for 10 minutes shows seven peaks at 68, 130, 176, 276, 300, 360, and 416 °C labelled I through VII. The sample annealed for 1 hour has five peaks at 70, 128, 176, 234, and 308 °C labelled I-V respectively. A study of dosimetric features and kinetic analysis was carried out on the two prominent peaks, peak I and III for both samples. The peaks show a sublinear dose response for irradiation doses between 10 and 300 Gy. The electron trap responsible for peak I depletes faster at high duration annealing between irradiation and measurement. In contrast, the electron trap for peak III was more stable for both samples. Kinetic analysis shows that peak I is a first-order peak and peak III a non-first-order peak. The activation energy obtained using the initial rise, whole glow peak, and curve fitting methods is between 0.904±0.004 and 1.07±0.10 eV for peak I and between 1.10±0.01 and 1.23±0.01 eV for peak III. In particular, the kinetic parameters obtained for both peaks decrease with annealing time. This suggests that the duration of annealing at 1000 °C has an effect on the trap parameters of natural quartz.

Apply to be considered for a student ; award (Yes / No)?

No

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