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# Phototransferred thermoluminescence of synthetic quartz: Analysis of illumination-time response curves

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## Abstract

Phototransferred thermoluminescence (PTTL) induced in synthetic quartz by 470 nm blue light is reported. The glow curve measured at 5°C/s up to 500°C after irradiation to 100 Gy shows six peaks at 94, 116, 175, 212, 280 and 348°C labelled I through VI and another one at 80°C (labelled A1). PTTL is only observed for peaks A1 and I and is induced at peak A1 as long as peak III has been removed by preheating and at peak I after preheating to deplete peak VI. The inducement of PTTL even when all peaks have been removed points to deep electron traps in the quartz also acting as donors in addition to the putative ones below 500°C. The PTTL intensity as a function of duration of illumination for A1 goes through a peak and decreases monotonically or to a stable value depending on the preheating temperature. The change of PTTL intensity as a function of illumination time is described using a set of coupled linear differential equations. The number of acceptors and donors in a particular system described in this way is influenced by the preheating temperature.

**Keywords:** Synthetic-quartz; phototransferred thermoluminescence; kinetic analysis; models

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