THERMOLUMINESCENCE STUDIES OF ANNEALED PLAGIOCLASE FELDSPARS

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Plagioclase feldspars, present in most meteorite classes, are highly sensitive to their metamorphic and shock histories. The mineral is also usually the major thermoluminescence (TL) phosphor, so that the phenomenon provides a uniquely sensitive and quantitative means of monitoring these and related processes. However, our understanding of the relationship between details of the TL emission and the physical state of the feldspar is rather fragmentary. To help clarify this we have determined the TL properties of terrestrial feldspars subjected to shock-loading (Hartmetz *et al.*, 1986) and to annealing; the present paper concerns the latter.

50-75 mg samples of oligoclase and bytownite in the low-temperature (ordered) form (Ostertag, 1983) were sealed with an inert atmosphere in high-purity quartz vials and annealed in wire-wound tube furnaces at 533-976°C for 100 h. The TL curves of two or three 4 mg aliquants were then measured using the techniques of Sears and Weeks (1983).

The TL peak temperature of both feldspars increased in response to the annealing treatment. The dominant peak in oligoclase moved from 146±16°C to 175±5°C after annealing to 635°C, and to 230±10°C after annealing at 744°C. All oligoclase samples produced curves with a peak at 277±19°C, and this became the dominant peak after annealing at $>$ 786°C. The dominant peak for bytownite moved steadily from 144±5 to 210±5°C as the samples were annealed 533-786°C and the peak width increased from 116±12 to 221±6°C. These trends are very similar to those shown by Amelia albite (Pasternak, 1978), several type 3.4 ordinary chondrites (Guimon *et al.*, 1985, and unpublished), and the EETA79001 and Zagami shergottites were similarly annealed (Hasan *et al.*, 1986), consistent with our previous suggestions that the TL phosphor in these meteorites is feldspar in the low-temperature form. In his study of albite, Pasternak attributed these changes in TL properties to the onset of disordering, although the details were unclear (Pasternak, 1978). The changes observed in the present study also resemble those produced in the same feldspars by shock-loading (Hartmetz *et al.*, 1986), suggesting that it is the elevated temperatures associated with the shock that are responsible for the changes.

Guimon *et al.*, 1985. *GCA* **49**, 1515.
Hartmetz *et al.*, 1986. *LPS XVII*, 311.
Hasan *et al.*, 1986. *GCA*, in press.
Ostertag, 1983. *Proc. LPSC 14th,* B364.
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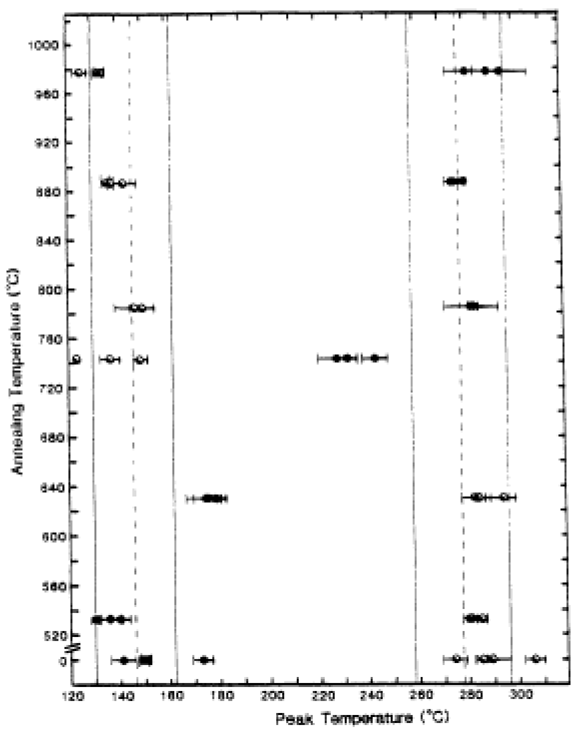

Fig. 1 **Plot of annealing temperature vs. glow curve temperature for discrete peaks (filled symbol) and inflections (half-filled symbol). Typical 1 sigma uncertainties for the annealing temperature are 5°C. Vertical lines refer to the mean ± 1 sigma for a given peak in all samples (146±16 and 277±19°C).**

Hartmetz, C.P. and Sears, D.W.G. (1986) Thermoluminescence studies of annealed plagioclase feldspar. *Meteoritics*, **21**, 388-389.