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The Thermoluminescence Properties of Chondrules from Three Low Petrologic Type Ordinary Chondrites. D. W. G. Sears,¹ Jie Lu,¹ R. K. Guimon,² A. D. Morse,³ R. Hutchison,⁴ C. O. Alexander,³ I. P. Wright³ and C. T. Pillinger.³ ¹Cosmochemistry Group, Department of Chemistry and Biochemistry, Univ. Arkansas, Fayetteville, AR USA. ²Physical Science Dept., Missouri Valley College, Marshall, MO USA. ³Planetary Science Unit, Open University, Milton Keynes, UK. ⁴Mineralogy Department, British Museum, London, UK.

As part of a larger project to explore the secondary history of chondrules from low-type meteorites by petrologic, isotopic and TL techniques (1), we have measured the TL properties of separated chondrules from Semarkona (3.0), Bishunpur (3.1) and Chainpur (3.4). Previous work has shown that the TL sensitivity of chondrules is related to the amount of crystalline feldspar in chondrule mesostasis and that the peak temperature and width of the induced TL curves are related to the relative amount of feldspar in the high and low temperature forms. This, in turn, is governed by the feldspar's formation temperature and post-formation cooling rate (2).

The chondrules from Semarkona show a 10⁴-fold range in TL sensitivity with no correlation between TL sensitivity and peak temperature (1), while Bishunpur and Chainpur show a 10⁴-fold range in TL sensitivity with weak correlations between TL sensitivity and peak temperature. In contrast, Dhajala (3.8) shows a strong correlation between TL sensitivity and peak temperature which suggests that 80% of the chondrules contain relatively large amounts of feldspar in the high form while the remainder have small amounts of feldspar in the low-form. Chondrules from all three meteorites show peak temperatures ranging over 80–240 °C, but while the spread is uniform for the others, the Chainpur data tend to cluster in the 100–140 °C range. The Chainpur chondrules show a correlation between peak temperature and width, similar to that displayed by Dhajala, but with very few chondrules in the cluster corresponding to high-feldspar. In all three meteorites, matrix samples show considerably less spread in TL sensitivity than do chondrules, and they have values 2–3 orders of magnitude below those of the brighter chondrules.

The clustering of peak temperatures for the Chainpur data suggests that feldspar in these chondrules is predominantly in the low-form and the proportion of chondrules with TL sensitivities higher than the highest observed in Semarkona and Bishunpur shows that the amounts of feldspar present are much higher. The simplest interpretation is that Chainpur is more highly metamorphosed than the others, but remained in the low-field throughout metamorphism (<600 °C). However, even Chainpur chondrules with low TL sensitivities tend to have peak temperatures corresponding to low-form. Either the low levels of metamorphism experienced by Chainpur converted high feldspar observed in Semarkona and Bishunpur to low feldspar without changing the amount present by devitrification of the mesostases, or the low feldspar in Semarkona and Bishunpur has been preferentially destroyed relative to the high-form. Aqueous alteration has been shown to preferentially attack the low form (3), consistent with several lines of evidence for aqueous alteration in these chondrites (1). Further isotopic and petrologic work will help resolve this point. (Support: NASA NAG 9-81, NSF INT8612744, SERC GRE 16564.) References: (1) Sears *et al.* (1988) *LPS* **19**, 1051. (2) Keck *et al.* (1987) *EPSL* **77**, 419. (3) Guimon *et al.* (1988) *GCA* **52**, 119.