

SOLAR-FLARE TRACK STUDIES OF THE ELM CREEK AND DIMMITT CHONDRITES

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Grains from the 45-150 μm sieve fractions of crushed samples of the Elm Creek (H4) and Dimmitt (H3,4) chondrites have been etched in WN solution (1) at pH 8 to reveal tracks in olivines. About 1600 and 6000 olivine crystals from Elm Creek and Dimmitt, respectively, have been scanned with the following results.

Cosmic-ray track densities are low ($\ll 10^3 \text{cm}^{-2}$) in both cases, and both meteorites must have been large, $>40\text{-}50$ cm in radius, prior to atmospheric entry.

Elm Creek contains $\sim 2\%$ of track-rich olivines ($\rho \gtrsim 10^6 \text{cm}^{-2}$), indicating a pre-compaction irradiation, which is consistent with its high rare-gas content (^{20}Ne , $\sim 5 \times 10^{-6}$ cc STP/g; (2)). Grains with and without track-density gradients are present.

Dimmitt is also gas-rich according to the criteria enumerated by Wasson (3). However, no track-rich grains were identified in this sample. Five slices of area $\sim 1 \text{cm}^2$ each were also examined, and again no solar-flare-irradiated olivines were observed. Dimmitt is particularly interesting in that Neon-E has been observed in certain phases within it (4). It was originally suggested that Ne-E was associated with unmetamorphosed interstellar grains. Neon-E has been identified in many carbonaceous chondrites (5), and these have also been shown to bear evidence of formation on a lightly irradiated regolith (6). The rare-gas contents of Dimmitt are indeed more typical of those of carbonaceous chondrites than of the usual run of gas-rich meteorites. However, our results imply an abundance of track-rich grains of $\lesssim 10^{-4}$, which is much lower than for olivines from carbonaceous chondrites (6) (typically $\sim 0.01 - 0.1$). Possibly, Ne-E was gained without significant implantation of solar wind.

Further studies are necessary to establish these results. It should be noted that regolithic meteorite samples are subject to considerable inhomogeneity.

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