SMALL SCALE HETEROGENEITIES IN K/T BOUNDARY TEKTITES FROM MIMBRAL;

Bell, M.S., and Sharpton, V.L., Lunar and Planetary Institute, 3600 Bay Area Blvd., Houston, TX 77058

Relict tektites from El Mimbral, Mexico are from K/T boundary deposits considered to be proximal ejecta related to the Chicxulub impact crater on the Yucatan peninsula. Our dark-brown Mimbral clasts are from the spherule bed (layer 1 of Bohor & Betterton)(1) just above the latest Maastrichtian Mendez formation and are postulated to have been deposited initially in a shallow water environment. Relict tektites examined in this study are similar in bulk composition to those in previous reports of Mimbral tektites (2,3). Previous studies describe compositions determined to be homogenous on the 10 - 100 micron scale. However, spot analyses of Mimbral glass reveal small scale heterogeneities within individual fragments which were not optically apparent. Elemental mapping was utilized to illuminate heterogeneities in the range of 5 to 100 microns and to more clearly characterize their distribution. Compositional variations determined by mapping have been quantified by spot analysis and are described here.

Mimbral glass fragments were hand-picked under a microscope from samples which had been disaggregated by treatment with dilute HCL to dissolve the carbonate matrix (78 vol% of the sample). Mimbral glass appears vitreous under stereomicroscope and isotropic in thin section. Clasts are small (<1mm in diameter) and are not commonly found at Mimbral comprising <1 vol% of the sample. Spherules with relict glass cores similar to those found in Haiti have not been found at Mimbral possibly due to the highly altered nature of the deposits, although large spherules of secondary components are abundant.

Quantitative analysis by electron microprobe produced slightly low wt % oxide totals from Mimbral clasts (88 to 95%) but such totals correspond to those of samples previously analyzed (1,2). Total Alkalis vs. Silica and Oxide variation diagrams demonstrate similarities in bulk composition of our samples to those of previous studies (Fig.1). As a group, dark brown Mimbral glass fragments range broadly from 42 - 72 wt % SiO_2 and < 1 - >7 wt % total alkalis (basaltic to dacitic). Our Mimbral samples contain much higher and lower total wt% FeO , higher wt% TiO2 , and lower CaO than those in other studies. Regions of variation occur evenly throughout fragments within a 5 micron zone of alteration at the boundary. In two mimbral clasts mapped here, Na, K and Fe contents vary on a scale of 5-10 microns and greater but are not restricted to "schlieren-like" zones. Areas of high Ti concentration 5-10 microns in size occur in both of these clasts (Fig.2).

One clast, chosen for analysis because of its glassy appearance similar to Mimbral tektites, has a much different composition. It contains two altered spherules ~50 microns in diameter and three ~5 micron iron-nickel nodules in a microcrystalline calcareous matrix (Fig.3). The spherules and nodules are embedded in the matrix and not precipitated in fractures. The larger spherule contains an ~1 micron area of high Ti concentration and two ~1 micron spots of high K concentration. Elemental maps of these two spherules display compositional trends similar to larger tektites from Mimbral.

Heterogeneities in Mimbral glasses can be attributed both to secondary alteration and to primary heterogeneities. Areas of high TiO and FeO in Mimbral samples are evidence that certain elements were present in variable amounts within the melt and are primary heterogeneities which represent source and formation conditions rather than alteration processes. However, the 5

HETEROGENEITIES IN TEKTITES FROM MIMBRAL: Bell, M.S., and Sharpton, V.L.

micron wide zone of alteration surrounding Mimbral clasts, their low occurrence, small size, and low analysis totals are evidence of secondary processes.

References: (1) B.F. Bohor and W.J. Betterton, *LPSC XXIV*, 143 (1993); (2) J. Smit *et al.*, *Geology*, **20**, 99 (1992); (3) W. Stinnesbeck *et al.*, *Geology*, **21**, 797 (1993); (4) G.A.Izett, *JGR*, **96**, 20,879 (1991).

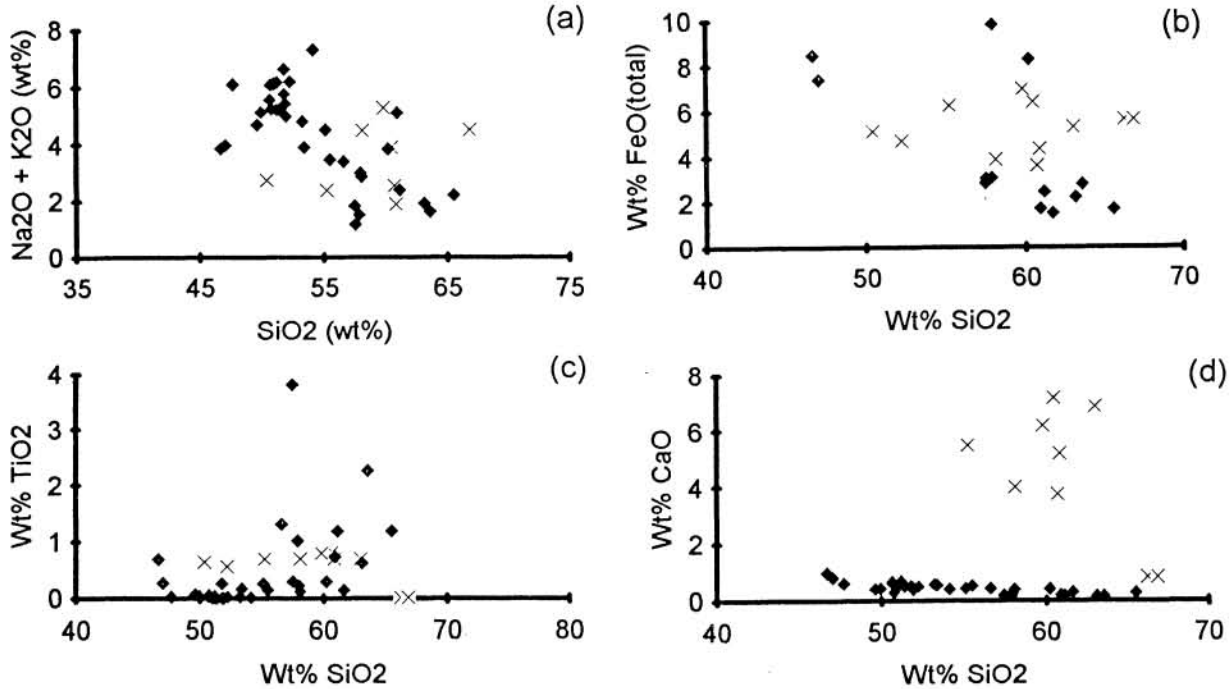

Figure 1: (a) Total Alkalis vs Silica, (b) Iron Oxide, (c) Titanium Oxide, and (d) Calcium Oxide variation diagrams for Mimbral tektites (this study - closed diamonds) and previous studies (1,2,3 -Xs) .

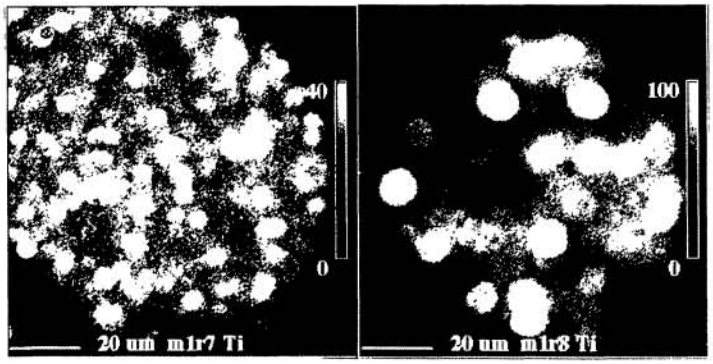

Figure 2: Ti concentration maps of Mimbral clasts showing elemental distribution.

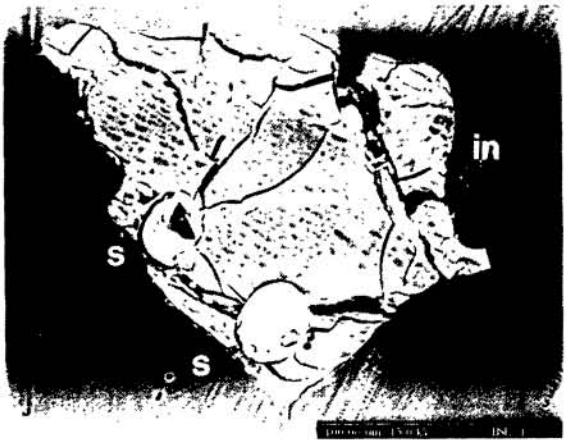

Figure 3: Back scattered electron image of clast with silica spherules (s) and iron-nickel nodules (in)