COMPOSITIONS OF GLASSES IN METEORITE Y86032 AND COMPARISONS TO OTHER FELDSPATHIC LUNAR METEORITES.

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Introduction. It has generally been thought that feldspathic lunar meteorites Y82192, Y82193, and Y86032 are paired, but recent geochemical studies by [1] have indicated that Y86032 may not be paired with Y82192/3. Those studies showed that, although the meteorites are very similar and are probably closely related, Y86032 is compositionally distinct from Y82192/3. Our previous petrologic studies of Y82192/3 and Y86032 [2] (a collaborative effort between our group at JSC and Takeda's group) assumed that Y86032 was paired with Y82192/3. That work included data for glasses in Y82192/3 but did not include data for Y86032 glasses. We have recently begun studies of glasses in thin section Y86032,51-3 (provided by the National Institute of Polar Research, Tokyo, Japan). The data will be useful in determining small-scale similarities and differences between Y82193 and Y86032. Petrographic and compositional differences among the feldspathic lunar meteorites are subtle; these subtle differences may be of key importance in understanding the lunar meteorites and the lunar highlands crust.

Results. Thin section Y86032,51-3 is very similar to previously studied Y82193,91-1 [2] and shows that Y86032 is a very compact feldspathic breccia with a glassy matrix. It contains a high proportion of impact melt breccia clasts and a few coarse-grained highlands lithic fragments. The presence of rare spherules marks Y86032 as a regolith breccia with a very small regolith component, quite similar to Y82192/3. Therefore, Y86032 is a very immature regolith breccia and, like Y82192/3, it has many petrographic similaries to the Apollo 16 feldspathic fragmental breccias, which contain no evidence of exposure at the lunar surface.

Using the procedures described in [2], glass clasts in Y86032,51-3 were studied by means of SEM/EDS, analyzed by electron microprobe, and classified according to composition. Glass clasts are rare in Y86032,51-3 and this low abundance is very similar to glass abundances in Y82193 [2] and MAC88104/5 [3]. None of the Y86032 glasses are true homogeneous glass. All of them are devitrified or quench-crystallized to some extent. Homogeneous glasses have not been identified in either Y86032 or Y82193. As reported in [2], an absence of homogeneous glass is characteristic of most feldspathic lunar meteorites, although one homogeneous glass sphere was found in MAC88104/5 [3].

Of the 31 glasses analyzed in Y86032,51-3, most (25) have highland basalt (feldspathic) compositions with Al_2O_3 ≥23 wt%. The other six glasses are of LKFM (low-K Fra Mauro) composition, with Al_2O_3 <23 wt% and K_2O <0.25 wt%. So far, no other glass types have been found in Y86032, although a trace of KREEP glass was found in Y82193 [2], and both KREEP and granitic glasses have been identified in MAC88104/5 [3]. Average compositions for the glass types in Y86032,51-3 are given in Table 1. The Y86032 averages are very much like those for highland basalt and LKFM glasses in Y82193 (Table 1). Figure 1 (CaO/Al_2O_3 vs. FeO) shows that the range of glass compositions in Y86032 is much like that of Y82193 glasses. It also shows that all glasses in both samples are of nonmare origin because none of them fall in the mare field (defined by CaO/Al_2O_3 = 0.75 and FeO = 13.0 wt%). The averages and ranges of Mg numbers (atomic Mg/Mg + Fe) are also very similar in Y86032 and Y82193 (Table 1, Fig. 3). Therefore, the highland basalt and LKFM glasses in Y86032 and Y82193 do not reflect the differences in bulk meteorite compositions found by [1]. In contrast, Table 1 shows that glasses in MAC88104/5 do reflect bulk compositional differences from Y86032 and Y82193 (e.g., the slightly lower Mg numbers in the MAC88104/5 glasses).

Summary. The general similarities of the feldspathic lunar meteorites are reflected in their glass populations and compositions. Glasses in Y86032 are much like those in Y82193, so the bulk compositional differences between Y86032 and Y82192/3 [1] are caused by differences in some component other than glasses. The strong similarities of the Y86032 and Y82192/3 glasses support the idea that the samples are closely related, whether or not they are paired meteorites.

References: [1] Lindstrom et al. (1990) *Proc. NIPR Symp. Ant. Met.* (in press). [2] Takeda et al. (1990) *Proc. Lunar Planet. Sci. Conf. 20th*, pp. 91-100. [3] Lindstrom et al. (1991) *Geochim. Cosmoschim. Acta* (in preparation).

TABLE 1: Average compositions of glass types in thin section Y86032,51-3 as determined by electron microprobe. Average Y82193 (Y82) glass compositions are from [2] and average MAC88104/5 (MAC88) glass compositions are from [3].

	----- HIGHLAND BASALT -----			---------- LKFM ----------		
	Y86	Y82	MAC88	Y86	Y82	MAC88
SiO_2	44.6	44.2	44.8	44.7	44.8	47.7
TiO_2	0.20	0.18	0.23	0.32	0.22	0.71
Al_2O_3	27.9	27.8	28.7	19.2	19.4	17.9
Cr_2O_3	0.12	0.12	0.11	0.26	0.23	0.32
FeO	5.76	5.25	4.95	11.5	11.0	11.3
MnO	0.08	0.07	0.07	0.15	0.15	0.18
MgO	6.19	5.62	4.71	12.8	10.8	10.2
CaO	15.8	16.0	16.4	11.8	12.2	11.9
Na_2O	0.34	0.34	0.34	0.27	0.46	0.36
K_2O	0.04	0.02	0.02	0.03	0.03	0.03
P_2O_5	0.02	0.03	0.03	0.05	0.05	0.05
TOTAL	101.0	99.6	100.3	101.0	99.3	100.6
CaO/Al_2O_3	0.56	0.58	0.57	0.62	0.63	0.66
Mg' (atomic)	0.66	0.65	0.63	0.66	0.63	0.61
No. of grains	25	25	22	6	5	6

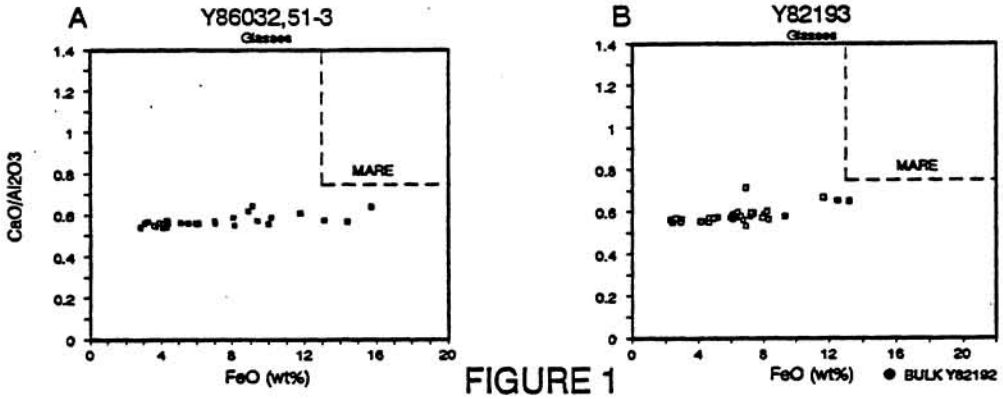

FIGURE 1

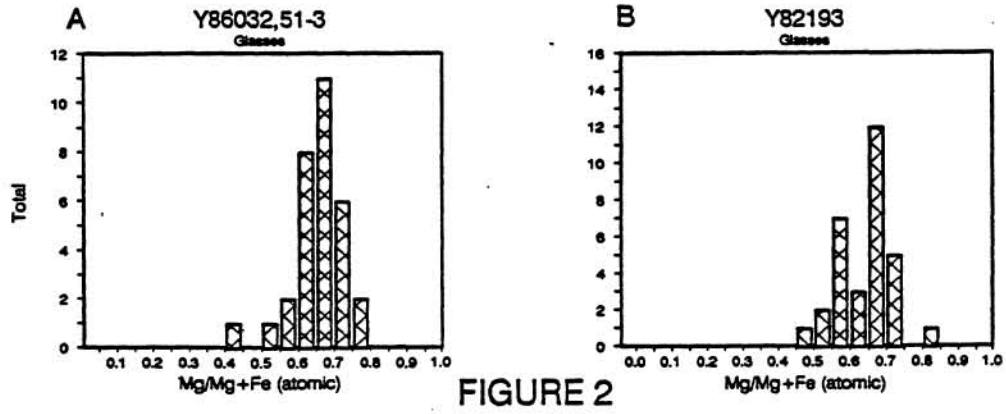

FIGURE 2