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SINGLE AGGLUTINATES: A COMPARATIVE STUDY OF COMPOSITIONS OF AGGLUTINITIC GLASS, WHOLE-GRAIN, BULK SOIL, AND FMR; A. Basu, R. Robinson (Dept. Geol. Sci., Indiana U., Bloomington, IN 47405), D.S. McKay, D.P. Blanchard, R.V. Morris (NASA-JSC, Houston, TX 77058), and S.J. Wentworth (LESC, Houston, TX 77058)

INTRODUCTION. Previous workers on *single agglutinates* have variously interpreted the composition of agglutinitic glass to represent impact melts of (a) bulk soil, (b) mixed components in finer sizes, and (c) micro-targets [1,3,4,8,10]. Separately, Papike has argued in favor of fusion of the finest fraction of bulk soils [13].

SAMPLES AND ANALYSIS. We hand-picked 34 single agglutinates from the mature Apollo 16 soil 61181 (I_s/FeO = 82) and measured the FMR and chemical composition (INAA for Fe, Sc, Sm, Co, Ni, Cr) of each agglutinate particle. Thirteen of these single agglutinates were selected for electron beam microanalysis and imaging. We have analyzed <1μm spots (for Na, Mg, Al, Si, P, S, K, Ca, Ti, Cr, Mn, Fe, Ni, Ba) on pure glassy areas (approximately ten in each particle) selected on the basis of optical and BSE images (avoiding all clasts and inclusions) with a CAMECA SX50 electron microprobe to obtain average glass compositions of each single agglutinate.

GLASS COMPOSITIONS AND 61181 SOIL COMPOSITION. Our data show a very strong negative correlation between (Al_2O_3+CaO) and (MgO+FeO) and a positive correlation between MgO and FeO, suggesting that the distribution of felsic and mafic minerals in the target generally control the composition of the melt (figs. 1,2). MgO (11.91%) in the glass of particle #48 is about twice the average of the rest. Relative to average agglutinitic glass in this soil, this grain has higher SiO_2 and much lower Al_2O_3 and CaO indicating that some bronzitic pyroxene dominated the micro-target that melted to form the glass of particle #48.

Our average agglutinitic glass composition deviates from that of the bulk soil composition [12]. Specifically, Na_2O, K_2O, and BaO are depleted in the glass relative to the bulk soil, suggesting that fine grained mare basalt mesostasis material or fine grained matrix of KREEPy breccias did not melt preferentially to produce these agglutinates (although preferential vapor loss of these components is also a possibility). However, P_2O_5, TiO_2, MnO and NiO are enriched in the glass suggesting that melted apatite, ilmenite, and some meteoritic component are enriched in the glass.

COMPARISON WITH WHOLE-GRAIN COMPOSITION. No correlation is evident between the total Fe content of each grain and the concentration of either Ni in the grains or SO_2 in the glass (fig. 3). If S and Ni primarily represent meteoritic components, then the total Fe in the 13 grains is largely indigenous (i.e. of lunar sources). The lack of correlation between concentrations of Ni in the glass and that in the whole agglutinate further confirms that the projectile composition does not significantly control composition of agglutinitic glass. An enrichment of S in the glass could come from incorporation of S vapor-coated submicron grains in the glass [9]. There is a weak but not a 1:1 correlation between FeO in the glass and the whole particle (fig. 4) indicating that the clast population in an agglutinate represents the micro-target from which the glass was produced, only in part. This suggests that dust grains on the lunar surface are distributed somewhat inhomogeneously at the scale of single agglutinate production by micrometeoritic bombardment.

COMPARISON WITH WHOLE-GRAIN FMR (I_s/FeO). I_s/FeO depends primarily on the production of single domain Fe° by reduction of FeO from silicate and oxide minerals in micrometeoritic impact melts of lunar dust impregnated with solar wind hydrogen [5,6,10]. The process is independent of the composition of any Fe-bearing micro-target. A plot of major oxides in agglutinitic glass vs. I_s/FeO confirms that bulk compositions of agglutinitic glass are independent of maturity. If however, some agglutinates are repeatedly melted i.e. recycled into newer agglutinates, FeO in the glass will be further reduced and partitioned into single domain Fe°. Ideally then, glass in the more mature agglutinates will tend to have lesser concentrations of FeO and more Fe° than the glass in a less mature agglutinate of the same bulk composition.

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