PETROGRAPHY AND MINERALOGY OF DHOFAR 1428 LUNAR HIGHLAND REGOLITH BRECCIA. Ai-Cheng Zhang[1,2], Wei-Biao Hsu[1], Yang Liu[2], and Lawrence A. Taylor[2]. [1]Purple Mountain Observatory, Nanjing 210008, China, E-mail: aczhang@pmo.ac.cn; [2]Planetary Geosciences Institute, Department of Earth and Planetary Sciences, University of Tennessee, Knoxville TN 37996, USA.

Introduction: Dhofar 1428 is a lunar feldspathic breccia found in 2006. Bunch et al. [1] briefly described mineral chemistry of Dhofar 1428. Korotev and Zeigler [2] analyzed its bulk FeO and Sm compositions. Here, we report such detailed data for Dhofar 1428.

Results and Discussion: Dhofar 1428 has a distinct breccia texture with numerous fragments of rock, mineral, and glass all welded by a glassy matrix. This matrix shows a schlieren texture and contains numerous small rounded vesicles, implying that Dhofar 1428 is a regolith breccia.

Feldspathic lithic clasts are the dominant clast type, and mafic lithic clasts also exist. These lithic clasts range from troctolite to spinel troctolite, to anorthositic gabbro, and to anorthosite. Most lithic clasts show a fine-grain granulitic texture. A few lithic clasts have a subophitic texture and are relatively coarse-grained. Impact-melt breccias are also present. One unusual object is a rounded bead, ~200 μm in diameter, and consists of only olivine and plagioclase, partly with a barred texture, similar to a barred-olivine chondrule. One irregular clast consists of plagioclase, K-feldspar, phosphates, ilmenite, and Si-rich glass, probably representing a mare basalt mesostasis. A fragment composed of ilmenite, baddeleyite, and sulfide was also observed. Most mineral fragments are relatively fine-grained. A few big pyroxene grains contain coarse exsolution lamellae (up to 20 μm in width) and the estimated equilibrium temperature interval is 980−700 °C; however, no zoned pyroxene grains were observed. At the same time, a few olivine grains are zoned.

Most lithic clasts in Dhofar 1428 are ferroan with Mg# [Mg/(Mg+Fe)] values of mafic minerals varying from 0.51 to 0.78. Only one lithic clast contains Fe-rich olivine (Fo_{32}) and relatively Fe-enriched pyroxene (Mg# = 0.51–0.61). Most plagioclase grains in lithic and mineral fragments have An values higher than 94. Olivine grains in the chondrule-like object are Mg-enriched (Fo_{80}) and have lower Fe/Mn values than other olivine grains. In addition, plagioclase grains in the chondrule-like object are relatively Na-enriched ($An_{87.1–89.5}$). This unique mineral chemistry supports a possible meteoritic origin. Oxygen isotopic analysis of this object is in process.

Glassy fragments have two major compositions. One contains moderate Al_2O_3 and FeO + MgO contents (15.9–17 wt% and 16.4–18.9 wt%, resp.) and has an Mg# value of 0.5. The other group of glass fragments contains high Al_2O_3 contents (26.1–29.7 wt%) and low FeO + MgO contents (8.3–14.4 wt%). The Mg# values are 0.63−0.76. The glassy matrix is feldspathic, with high Al_2O_3 (25.6–33.3 wt%, avg. = 31 wt%) and low FeO + MgO (3.91–13.1 wt%). The Mg# values are 0.59−0.65.

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References: [1] Bunch T.E. et al. 2006. Abstract #5254. 69th Annual Meteoritical Society Meeting. [2] Korotev R.L. & Zeigler R.A. 2007. Abstract #1340. 38th Lunar and Planetary Science Conference.