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^{40}Ar/^{39}Ar age studies Basaltic Lunar meteorite La Paz 02205

V. A. Fernandes(1,2) and R. Burgess(2)

(1) Inst. Geofísico, Univ. Coimbra, Portugal, (2) Isotope Geoch. And Cosmoch. Group, Univ. Manchester, UK (veraafernandes@yahoo.com)

Lunar samples brought by the Apollo and Luna Missions are scarce and finite, additional manned or robotic missions have not yet been scheduled. The recognition that some of the meteorites are lunar has greatly increased lunar research possibilities. Apollo and Luna missions sampled $\leq$ 5%of the total planet [1], so the study of meteorites can greatly increase the sampled area. More recently, it has been suggested most of the Apollo samples may pose bias in the understanding of the lunar history and evolution [2,3] because of their position in or close to the Procellarum-KREEP Terrain (PKT). In contrast, lunar meteorites may provide a more varied and less biased selection of lunar material. The basaltic ones can have increase the number of recognised lava flows on the lunar surface. There are 6 lunar basaltic meteorites that have been discovered in Antarctica and the Sahara Desert. The history of these materials is usually not very complex a mostly they are composed of a single lithology and have not experienced many. Age determinations (formation and exposure) and studies of Ar-isotopes, using two different techniques (IR-arep heating and UV-laser spot analyses) have been carried out on the recently found La Paz 02205 (LAP02205) lunar mare basalt. This meteorite has been classified as a coarse-grained unbrecciated lunar mare basalt [4-10] and is dominated by large crystals of plagioclase (100-600 μm) and pyroxene (100-500 μm). Previous work has indicated the existence of small olivines [4-10], in a small area in the section studied fayalite was identified. The present sample contains a region of mesostasis that includes a Si-glass vein, FeSi, FeS, together with ilmenite (<5 μm) and glass with composition showing mixing between plagioclase and pyroxene (also reported by 6 Mikouchi et al., 2004; 9 Anand et al., *in press*). Spinel is also found in small amounts. The bulk composition of LAP places it in the category of low Ti (TiO= 3.86 wt%) and slightly aluminous basalt (4 Joy et al.,

2004; 5 Jolliff et al., 2004; 9 Anand et al., 2004 and *in press*). IR-laser step heating results suggest a crystalisation age of 2.915±0.010 Ga. This age is consistent with the youngest age obtained by Rb-Sr [11] and that determined by Pb-Pb [12]. [11] also obtained an older age of 3.15±0.04 Ga (Sm-Nd). These authors suggest these two ages represent two volcanic extrusions: the younger age represents the extrusion of a younger lava flow over an older one. UV-laser shots have been performed on a thick section of this sample. Most shots do not show data which could bring further information regarding the history. However, the age obtained for 2 minutes ablation on a plagioclase is 3.15±0.14 Ga and on a pyroxene is 2.90±0.04 Ga. Both of these ages are within error similar to those obtained by [11]. An interesting result obtained during the UV-laser ablation experiments was in the region of the glassy mesostasis where a range in ages was 1.71 to 2.32 Ga with an average of 2.18±0.12 Ga, which may be that of the formation of the mesostasis. [12] reported Re-Os systematics of LAP to be disturbed at ~10 Ma, however the much younger event did not disturb the Ar systematics. However, [5,6] reported that several crystal grains showed evidence for undulatory extinction and other shock deformation features (e.g. maskylinatised plagioclase) due most likely to shock pressures. Further, Ar-Ar work will be done on fragments from the thick-section of LAP02205 to better understand the two ages obtained, in particular whether the younger age is the result of Ar loss due to a later lava extrusion, or due to an impact event.

Refs.: **[1]** Warren, 1991, Rev. Geophysics supp., 282-289; **[2]** Haskin, 1998, JGR, 103, 1679-1689; **[3]** Korotev, 1999, LPSC 30^{th}, #1305; **[4]** (Antarctic meteorite newsletter, 2003; **[5]** Joy et al. (2004), LPSC 35^{th}, #1545; **[6]** Jolliff et al. (2004) LPSC 35^{th}, #1438; **[7]** Mikouchi et al. (2004) LPSC 35^{th}, # 1548; **[8]** Korotev et al. (2004) LPSC **35**th, # 1416; **[9]** Righter et al. (2004) LPSC **35**th, # 1667; **[10]** Anand et al. (in press); [**11**] Nyquist et al. (2005)LPSC **36**th, # 1374; [12] Day et al. (2005) LPSC 36^{th},# 1424.