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Lunar Mare Basaltic Meteorites – LAP 02205, LAP 02224 and LAP 02226

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The lunar meteorites LAP 02205, 02224 and 02226, collected in Antarctica between the 2002-2004 ANSMET field seasons, represent part of the largest paired mass ($\sim$1875 kg) of lunar meteoritic material found on Earth to date. We have studied thin sections of LAP 02205(32), LAP 02224(35) and LAP 02226(25) and chips LAP 02205(13) and LAP 02224(31) in order to establish pairing relationships and magmatic history based on mineral chemistry and petrography.

The three stones are unbrecciated in nature and have a coarse-grained holocrystalline texture with phenocrysts up to $\sim$1 mm in size. They contain apparently identical suites of typical lunar basalt minerals with similar subophitic to intergranular crystalline textural relationships.

The mineral chemistry and petrography of the samples suggest that they were crystallised quite rapidly, probably as a surface flow deposit, from a melt that had a low-Ti, low-Al, low-K affinity. We infer they crystallised from relatively evolved lunar melt with extreme late stage fractionation that formed incompatible element enriched mesostasis areas.

Based on petrographic similarity, mineral chemistry and bulk chemistry the lunar meteorites LAP 02205, 02224 and 02226 are probably launched paired stones that originate from what may be the same parent melt body. As the stones are lunar basalts it is very likely that they were emplaced on the Moon's near-side in a mare region.

Bulk chemistry of chips of LAP 02205 and LAP 02224 by ICP-AES:

LAP 02205: Na_2O 0.42%, MgO 5.58% $Al_2O_3$10.13%, $SiO_2$44.53%, $P_2O_5$0.12%, K_20 0.12 %, CaO 11.23%, MnO 0.28%, $TiO_2$3.43%, FeO 21.69%, Ba (ppm) 170,

Cr (ppm) 1958, Sr (ppm) 131, Zr (ppm) 227. Mg# = 31.45.

LAP 02224: Na_2O 0.41%, MgO 6.47%, $Al_2O_3$9.93%, SiO_2 44.57%, P_2O_5 0.09%, K_20 0.11%, CaO 10.99%, MnO 0.28%, TiO_2 3.21%, FeO 21.29%, Ba (ppm)136, Cr (ppm) 2294, Sr (ppm) 120, Zr (ppm) 190. Mg# = 35.16.