

DIVERSE AND UNUSUAL O-CHONDRITES FROM THE LUT DESERT, IRAN.

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Introduction: Since the Shahdad (H5) chondrite was recovered in 2005 [1], it has been recognized that the Lut desert in Iran likely contains numerous preserved meteorites which have fallen over the last few thousand years [2, 3]. Several meteorites were recovered in 2013 from the large sand dunes in the Lut desert. These include three different atypical type 3 O-chondrites (Lut 003, 004, 005) and an H4 chondrite (Lut 002).

Three Unusual Type 3 Chondrites: Lut 005 (LL3), as well as Lut 006 and Lut 007, which are paired with Lut 005, are part of 92 fragments totaling 2.1kg found in a 50m² area. These meteorites consist of sharply defined, albeit somewhat oblate, chondrules tightly packed together and roughly aligned. Some chondrules are surrounded by a dark “matrix”, which consists wholly of 10-20µm long subhedral grains of albite (Ab₉₃₋₉₅) intergrown with relatively iron-rich (Fa₃₀₋₃₃) olivine, and rare low-Ca pyroxene grains. This matrix is different than the usual matrix of O-chondrites, which is composed of fine-grained (often submicron sized), dominantly silicate minerals (mainly olivine, low-Ca pyroxene, and amorphous material, with minor amounts of opaque minerals, albitic feldspar and phyllosilicates) [e.g., 4, 5, 6].

Lut 003 (L3), a single stone (504.5g), is heavily brecciated on the scale of individual chondrules; clearly defined whole chondrules are relatively rare. Interchondrule material consists of smaller chondrule and mineral fragments. No other type of matrix material is present. Numerous weathering veins cross the thin section, further fragmenting individual chondrules.

Lut 004 (H3), a single stone (504.6g), consists of tightly packed chondrules with only an occasional amount of intervening opaque matrix. In this instance, the matrix texture is typical of a type 3 chondrite, consisting of a mix of fine-grained silicates. What is unusual is the low abundance (<5%) of this matrix.

Variety of Meteorites: In addition to the three unusual type 3 chondrites (H3, L3, and LL3), a single stone (568g) of a typical H4 chondrite was found. Altogether, with Shahdad (H5), there appears to be a great variety of ordinary chondrites in the Lut desert.

References: [1] Garvie L.A.J. 2012. *Meteoritics & Planetary Science* 47:E1-E52. [2] Pourkhorsandi H. and Mirnejad H. 2012. Abstract #1096. 44th Lunar and Planetary Science Conference. [3] Pourkhorsandi H. and Mirnejad H. 2012. *Meteoritics & Planetary Science Supplement* id. 5003. [4] Huss G.R. et al. 1981 *Geochimica et Cosmochimica Acta* 45:33-51. [5] Nagahara H. 1984. *Geochimica et Cosmochimica Acta* 48:2581-2595. [6] Alexander C.M.O. et al. 1989. *Earth and Planetary Science Letters* 95:187-207.