JIDDAT AL HARASIS 422: THE FIRST UREILITIC IMPACT MELT BRECCIA. E. Janots[1], E. Gnos[2], B. A. Hofmann[3], R.C. Greenwood[4], I.A. Franchi[4] and A. Bischoff[5] [1]Institut für Mineralogie, WWU Münster, Corrensstr. 24, Germany. E-mail: emiliejanots@uni-muenster.de [2]Natural History Museum Geneva, Switzerland, [3]Natural History Museum Bern, Switzerland, [4]PSSRI, The Open University, Milton Keynes, MK7 6AA, United Kingdom, [5]Institut für Planetologie, WWU Münster, Wilhelm-Klemm-Str. 10, Germany.

Introduction: The ureilite Jiddat al Harasis (JaH) 422 [1], found in the Sultanate of Oman, is a single, rounded, reddish-brown breccia with a mass of 61.5 g. Fusion crust is not preserved, instead wind-polished surfaces are found with protruding dunite clasts. The ureilite breccia consists of 0.5-14 mm sized, rounded dunite clasts (~35.1 vol%) set in a fine-grained, crystalline matrix (~56.5%). The remaining 8.4 % are vesicles comparable with those in the recent ureilite fall in Sudan [2]. Both lithologies are finely recrystallized (grain size <50-70 µm).

Mineral and rock compositions: The matrix contains olivine (Fo_{83-90}), orthopyroxene ($En_{84-92}Wo_{0-5}$), augite ($En_{56-71}Wo_{20-31}$), graphite, diamond, oxidation products of metal and sulfides, chromite and interstitial, felsic melt relics. Despite evidence from the mineral assemblage for impact melting, whole-rock and trace element compositions are characteristic of type I (olivine-pigeonite) ureilites [3]. Dunite clasts show homogeneous cores (Fo_{78-80}) and a ~250 µm thick diffusional profile marked by outward Mg# increase towards the composition of matrix olivines. Oxygen isotope analyses of both the matrix and dunite clasts plot well within the ureilite field.

Ureilite cooling after impact: In dunite clasts, modelling indicates that a minimum of 3 years is needed to develop the observed diffusion profile. This is compatible with the crystal size of the dunite clasts and very different form the cooling of monomict ureilites [4].

Conclusions: JaH 422 is the first ureilitic impact melt breccia. Oxygen isotope data strongly suggests that dunite clasts and ureilite matrix are part of the primary ureilite parent body (UPB). The matrix is interpreted as having formed by impact melting of a type I ureilite followed by fractional crystallization. The vesicles probably formed during the oxidation of the carbonaceous material by smelting reactions. Dunite clasts confirm the existence of an olivine-rich lithology in the UPB. Recrystallization structures and compositional zoning of the dunite clasts indicate slow cooling on the UPB. The relatively slow cooling experienced by JaH 422 post impact suggests that it remained within the remnant UPB rather than in a secondary rubbe- pile ureilite body.

References: [1] *Meteoritical Bulletin 95, Meteoritics & Planetary Science* 44:in prep. [2] Jenniskens P. et al. 2009. *Nature* 458:485–488. [3] Downes H. et al. 2008. *Geochimica et Cosmochimica Acta* 72;4825-4844. [4] Mori H. and Takeda H. 1983. *Meteoritics* 67:1291–1308.