Dar al Gani 670 (DaG 670) is the third, independently found, fragment of the basaltic shergottite Dar al Gani 476/489 (DaG476/489). With this paper we wish to better characterize this important find by reporting the hand specimen description, petrography, and oxygen isotopic data.

**Hand Specimen Description:** DaG 670 is an irregularly shaped, angular stone weighing 1619 g (Fig. 1a) recovered by a private meteorite collector in 1999, in the Dar al Gani region (Libyan Sahara). It was found broken into three adjoining pieces weighing 688, 610 and 321 g. The stone is almost completely devoid of fusion crust and the external surface appears speckled with dark mm-sized olivine crystals set in a brown groundmass. Fusion crust is only present on one of the fragments as rare cm-sized dark-grey patches with polygonal fracturing. On freshly cut surfaces the olivine crystals appear black and the groundmass is grey-green. The lithology of the meteorite is homogeneous and isotropic. Pervasive fractures are filled with carbonate deposits. A direct comparison with the DaG 489 specimen shows that DaG 670 is more intensely weathered.

**Petrography:** One ~5 cm\(^2\) PTS was studied under optical microscope, SEM and EMP. DaG 670 mainly consists of medium-grained olivine crystals set in a fine-grained basaltic groundmass, dominated by pigeonite crystals and interstitial feldspathic glass (Fig. 1b). Texture, microstructures, mineral compositions, shock and weathering features are essentially identical to those of DaG 476/489 [1-3].

Mineral mode is pyroxene 59%, feldspathic glass 13%, olivine 11%, opaques 3%, merrillite 1%, impact melt pockets 11% and calcite 2%; the abundance of olivine is thus slightly lower than observed in DaG476/489 [1-3], and melt pockets significantly more abundant. Furthermore, contrary to what observed in DaG476/489, we found few medium-grained (1–2.5 mm) enstatite crystals (En\(_{83-72}\) Wo\(_{1.5-4}\)) mantled by groundmass pigeonite. Both differences are the reflection of an heterogeneous distribution of the constituent minerals and shock deformation in DaG476/489/670 at the cm scale.

Importantly, in DaG476/489 olivine shows corrosion microstructure indicative of disequilibrium interaction with the surrounding basaltic melt; in DaG 670 we also observe that the olivine crystals were intruded and broken apart by groundmass material. These features appear to fit more easily an origin of the olivine crystals as xenocrysts [2,4] or as partial melting residues [3], rather than as phenocrysts from a melt of DaG476/489/670 bulk composition [1].

**Oxygen Isotopes:** Analyses were performed on a whole-rock sample following the procedures described in [5]. Data are \(\delta^{17}\)O = 2.86‰, \(\delta^{18}\)O = 4.95‰, \(\Delta^{17}\)O = 0.28‰ and plot close to the SNC fractionation line [5], confirming the martian origin of DaG 670. The \(\Delta^{17}\)O is the lowest of the three Saharan shergottites, reflecting the highest levels of terrestrial weathering.