Study of three CO3 carbonaceous chondrites from the Atacama Desert, Chile

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Introduction: Three CO3 type carbonaceous chondrites found in the Atacama desert are presented here: Catalina 008, El Médano 216 and Los Vientos 123, part of the collection of Museo del Meteorito. The study is focused in the characterization of melt inclusions (MIs) found mainly in olivine crystals present in chondrules and also in the matrix, in order to better understand the composition of solid and gas components trapped before the closure of the system, to constraint solar nebula compositions and processes [1]. Also it was attempted to better constraint the thermal metamorphic degree of Catalina 008 and El Médano 216, as Los Vientos 123 was already determined to be a 3.1 type CO [2], using the Raman spectroscopy approach [3].

Techniques: Samples where studied in polished thin sections for optical and electronic microscopy (at Universidad de Chile and Sernageomin) and doble polished chips for fluid inclusion detection (Universidad de Chile) and analyses, that included LA-ICPMS (major, minor and trace elements) and Raman spectroscopy (Virginia Tech University). Powders were analyzed also with IR spectroscopy (at Cosmic Dust lab Universidad Diego Portales) and XRD (Sernageomin).

Preliminary results: Three types of melt inclusions assemblages (MIA) were identified so far in the three samples: MIA1 – consisting in pure glass, MIA2 – monocrystal, consisting in glass plus a single mineral grain and MIA3 – multiphase, consisting in glass plus a variety of minerals. MIAs recognized until now are grouped by 2 to 7 inclusions, which sized are between 16 and 60 um, many of them aligned but without a particular distribution, appearing in olivine crystals randomly in the core and at the rim.

It will be presented the first results from Raman and IR spectroscopy, XRD, the geochemical compositions obtained by Laser Ablation ICPMS in each sample, as well as all the petrographic constraints for each meteorite.

References: [1] Varela M.E. et al. (2005). Icarus 178(2), 553-569. [2] Bouvier A. et al. (2017) Meteoritical Bulletin Nº105 Meteoritics & Planetary Science 52(11):2411. [3] Bonal L. et al. (2007). Geochimica et Cosmochimica Acta 71:1605-1623.

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