NEWLY RECOGNIZED CLASSES OF TYPE 3 CARBONACEOUS CHONDRITES WITH EXTREME OXYGEN ISOTOPIC COMPOSITIONS BEYOND THE CCAM TREND.

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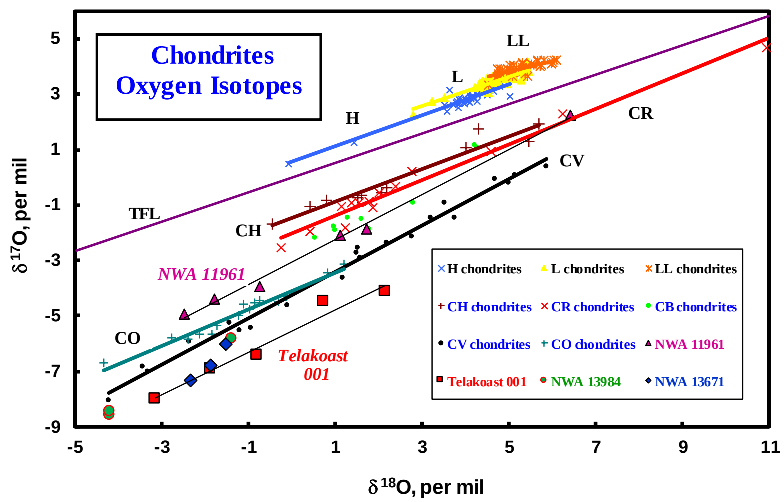
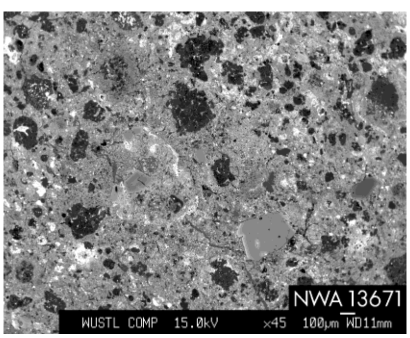
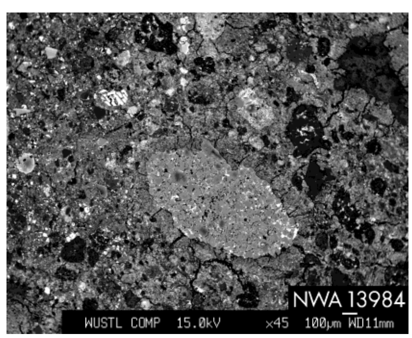
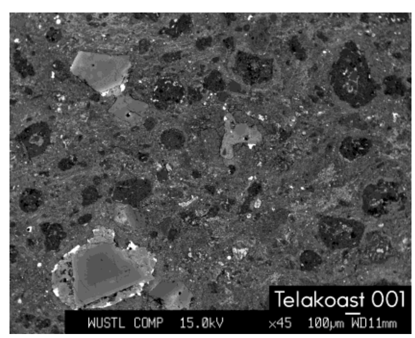
Background: As more meteorite specimens are recovered, especially in Northwest African desert regions, examples of ungrouped carbonaceous chondrites other than the well-known CV, CO, CK, CM, CH, CB and CR classes continue to be recognized. We previously documented NWA 11961 [1], which has oxygen isotope compositions displaced "above" the CCAM trend [2] towards the Terrestrial Fractionation Line. Here we describe three recent examples of ungrouped Type 3 carbonaceous chondrites with oxygen isotope compositions displaced "below" the CCAM trend: Northwest Africa 13671 Northwest Africa 13984 and Telakoast 001 Data for the oxygen isotope plot below were compiled mostly from [1, 2, 3].



Petrography: All of the evidently unpaired specimens discussed here are macroscopically similar in appearance to CM chondrites, being composed of very small chondrules in a black ultrafine-grained matrix, yet they do not contain phyllosilicates, tochilinite, smectite clay minerals or other hydrous mineral phases. Proper characterization required combined optical petrography, electron microprobe analysis, powder X-ray diffraction and oxygen isotope analysis.







Conclusions: The three specimens described here represent newly-recognized classes of carbonaceous chondrites which expand the pantheon of diverse documented ancient Solar System materials. This should not be surprising given the many low-albedo B-type asteroids detected by remote spectroscopy [e.g., 4], which are among candidates to be their proximal parent bodies.

References: [1] Irving A. *et al.* (2019) *Lunar Planet. Sci.* **XL**, #2542. [2] Clayton R. and Mayeda T. (1991) *Geochim. Cosmochim. Acta* **55**, 2317-2337. [3] Clayton R. and Mayeda T. (1999) *Geochim. Cosmochim. Acta* **39**, 1585-1594. [4] Clark B. *et al.* (2010) *J. Geophys. Res. Planets* **115**, doi.org/10.1029/2009JE003478.