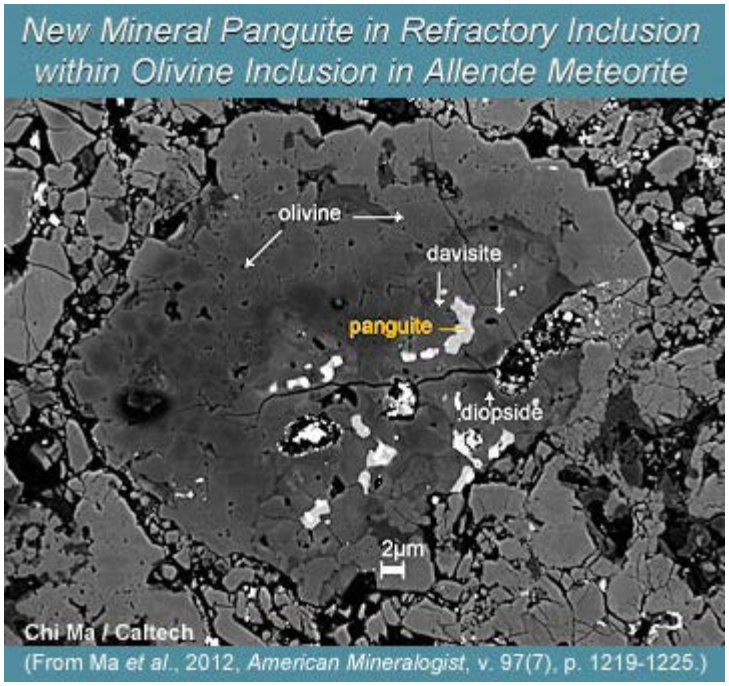
PLANETARY SCIENCE RESEARCH DISCOVERIES
CosmoSparks
Quick Views of Big Advances

Olympic-caliber Mineral Finder



Backscattered electron image of new mineral panguite inside an ultra-refractory inclusion within an amoeboid olivine inclusion in the Allende meteorite. Panguite occurs in association with titanium-bearing davisite.

Chi Ma, a senior scientist at Caltech's Division of Geological and Planetary Sciences, is an expert in nanometer-scale mineralogy with a particular interest in discovering new minerals. Teasing out the tinest of cosmochemical details, he and his colleagues have already discovered 14 new minerals in meteorites, nine from one meteorite alone—the Allende carbonaceous ***chondrite*** [***Data link*** from the Meteoritical Bulletin]. The olympian efforts by this team and others to study some of the early solids that formed in our Solar System are helping to unravel the details of ***nebular*** evolution, the components that accreted into rocky bodies, and the chemical processing on those bodies. Most recently, Ma and collaborators at Caltech, University of Nevada-Las Vegas, and the Argonne National Laboratory discovered the first occurrence of a brand new type of titanium oxide, as reported online June 26, 2012 in the ***American Mineralogist***. Using an array of high-resolution, high-tech microscopic and spectroscopic techniques the team discovered fine-grained crystals, 500–1800 nanometers in size, of $(Ti^{4+},Sc,Al,Mg,Zr,Ca)_{1.8}O_3$.

These grains are inside an ultra-***refractory inclusion*** (30x20 micrometers in size) within an olivine-rich inclusion (known as an amoeboid olivine inclusion) in Allende (see image). Looking like a cosmochemical set of nested Russian dolls with one chemically primitive component inside another, these refractory solids condensed from solar nebula gas before the planets formed, about 4.6 billion years ago.

In reference to a formation during the birth of our Solar System, Chi Ma named the new mineral panguite after Pan Gu, a giant from ancient Chinese mythology who established the world by separating yin from yang to create Earth and sky. The mineral and name have been approved by the International Mineralogical Association's Commission on New Minerals, Nomenclature, and Classification.

See: Ma, C., Tschauner, O., Beckett, J. R., Rossman, G. R., and Liu, W. (2012) Panguite, $(Ti^{4+},Sc,Al,Mg,Zr,Ca)_{1.8}O_3$, a new ultra-refractory titania mineral from the Allende meteorite: Synchrotron micro-diffraction and EBSD, *American Mineralogist,* v. 97(7), p.1219-1225.

Read ***more about panguite*** from Dr. Chi Ma's site at Caltech and the 26 June 2012 ***press release*** from Caltech.

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