SIMS STUDY OF TUCSON (IRUNGR) SILICATES.

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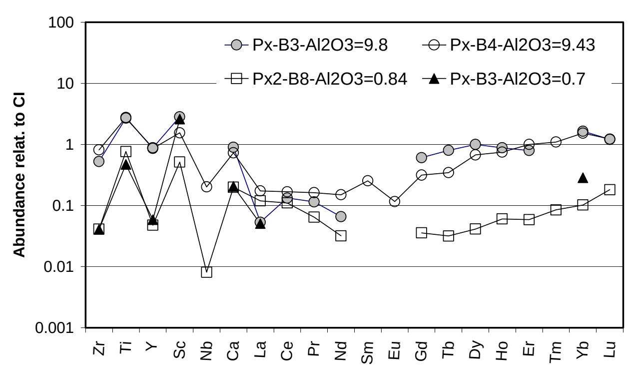
Introduction: Tucson is a unique polycrystalline ataxite with about 8 vol% silicates and a chemical composition of the metal (high Si: 0.8, Cr: 0.8 wt % and very low Ge, [1]) that make it distinctive among silicate-bearing iron meteorites [2-3].

Results: Silicate inclusions in the sections L3951 and Tucson B (NHM, Vienna) vary in size from ~40 to 1200 µm and are arranged in sub-parallel, curved plate aggregates ("flow pattern"). Inclusion sizes vary with the phases present. Small inclusions consist mostly of one (olivine) or two (olivine and glass) phases. Large ones are multiphase (e.g., olivine and pyroxenes as major phases, with minor glass, metal and brezinaite) and have serrated and/or smooth, curved interfaces with metal.

A typical large silicate inclusion consists of rounded olivines and irregular, cracked low-Al enstatite, all embedded in Al-rich low-Ca pyroxene. All phases are Fe-poor. Trace element contents of the Al-rich and Al-poor pyroxenes (arranged in decreasing order of Al_2O_3 content in the Fig.) are different. Variation among them is clearly observed over more than 1 order of magnitude in the abundances of the HREE (~ 0.05 to 1 x CI). In addition, low-Al pyroxene is poorer in Zr, Ti, Y, and Ca with respect to the high-Al pyroxenes. All phases (including olivine and glasses [4]) have a strong Nb- abundance anomaly, apparently caused by coexisting brezinaite, which has a very strong Nb+ anomaly The Al-rich pyroxene obviously is the latest phase that possibly formed by reaction of mainly olivine with a Si- and Al-rich medium. Consequently, the late addition of Al_2O_3 (and other refractory elements plus Si) to the early formed silicates must have been triggered by a (probably oxidative) de-stabilization of an early refractory element-rich phase. Like in other meteorites, silicates in Tucson also record highly reducing early and increasingly oxidizing conditions during their evolution – before they became trapped in the metal.



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References: [1] Wai and Wasson (1969) Geochim. Cosmochim. Acta 33, 1465-1471; [2] Wasson (1970) Geochim. Cosmochim. Acta 34, 957-964, [3] Wänke et al., (1983) Meteoritics 18, 416, [4] Varela et al. (2008) LPSC 39, #1373.pdf.