EVIDENCE FOR THE ORIGIN OF SiO_2 FROM MICRO-RAMAN STUDY. D. C. Hezel, H. Palme and F. E. Brenker, Institut für Mineralogie und Geochemie, Universität zu Köln, Zülpicherstraße 49b, 50674 Köln, Germany (d.hezel@uni-koeln.de).

Introduction: Silica occurs as minor constituent (<0.1 vol.%) in some chondritic meteorites e.g. [1]. Its occurrence is not predicted from equilibrium condensation calculations in a gas of solar composition [2]. Four possible formation mechanisms have been proposed to account for the occurrence of silica: (1) fractional condensation in the solar nebular [3-6]; (2) a magmatic origin on the parent body [7]; (3) reduction of enstatite on the parent body [8]; (4) sulfurization on the parent body [9].

At 1 bar SiO_2 has several polymorphs depending on temperature. Knowing the SiO_2-polymorphism is crucial to elucidate the mechanism of SiO_2 formation, because the four mechanisms described above have different temperature-time paths and different peak temperatures (FIG. 1). Silica-polymorphs can easily be distinguished using micro-Raman spectrometry. We currently perform a systematic micro-Raman analysis of SiO_2 in 38 thin sections from 26 different chondrites covering most types of chondrites.

Preliminary results & discussion: We found SiO_2 in about two-third of the thin sections analyzed so far (17). Most parageneses of SiO_2-rich components (SRC) are metal free SiO_2-orthopyroxene or SiO_2-pyroxene-olivine assemblages and if metal is present it contains Ni. Reduction or sulfurization of enstatite can therefore be excluded, as this should produce metal without Ni.

We found SiO_2 in chondrites of all petrologic types. An exclusively metamophic orgin of SiO_2 is therefore unlikely. Bovedy (L3) and Seres (H4) contain SRCs with textures and chemical compositions resembling SRCs in CH-chondrites [6] and may have a similar formation history, i.e. by fractional condensation and subsequent flash reheating. Micro-Raman analysis of these SRCs are in progress.

Micro-Raman analysis of a clast in Parnallee (LL3.6) surprisingly revealed a polymorphic zonation of SiO_2-laths with tridymite in the center and quartz in the rim, supporting a magmatic origin [7].

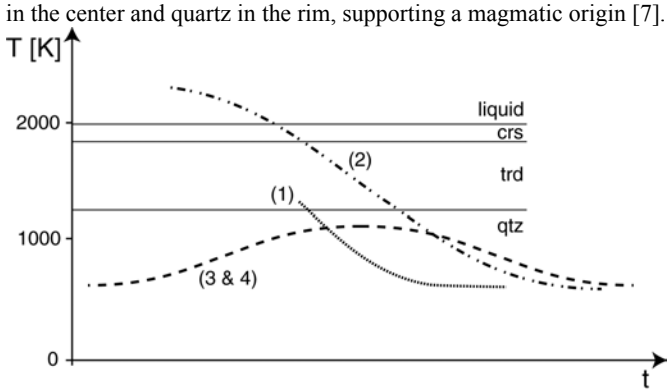

FIGURE 1: *Time-temperature paths for SiO_2 of different formation origins. (1) Fractional condensation, (2) magmatic origin on a parent body (3) oxidation and (4) sulfurization on a parent body. Approximate time-scales are days for (1) and million years for (2-4).*

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