a dozen and ranging in size from ~ 4-10 μm in diameter; collections of microcrystals varying from ~ 0.3 to 6 μm in diameter; layered, nearly circular plates forming a spheroidal plaquette ~ 7.5 μm in diameter; clusters of variable sized nodules ~ 0.3 to 6 μm, with concave features; framboidal magnetite; and finally collections of less distinct globules. All of these forms were sent *in situ* in small multiple pieces, ~ 1-5 mg each. No pre-treatment or processing was done except that the samples were coated with ~ 50 Å of Au-Pd to prevent charge build-up during electron microscopy.

In this presentation, we will discuss electron microprobe analysis of some of these features and the surrounding materials. The results will be discussed with regard to the possible chemical precursors for magnetite production in carbonaceous chondrites.

MÖSSBAUER SPECTROSCOPY AND X-RAY DIFFRACTION OF SAMPLES FROM THE SANTA CATHARINA IRON METEORITE

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Conversion Electron Mössbauer Spectroscopy (CEMS) of samples from the Santa Catharina iron meteorite shows the presence of the ordered iron-nickel phase with ~ 50% Ni, tetrataenite, and of the paramagnetic iron-nickel phase with $\lesssim$ 25% Ni. The FeNi phase with ~ 50% Ni amounts to ~ 70% of the iron-nickel alloys.

Furthermore, the CEM spectra show the presence of small peaks from one or more spinel compounds, most probably Fe_3O_4. These small peaks are more pronounced when regions near the rim of the samples — i.e. regions near cracks — are analyzed.

X-ray diffraction of different areas of the samples, both optically dark and optically light areas, shows the presence of a diffraction pattern from a single f.c.c. lattice with a lattice parameter of a $\simeq$ 3.58Å. This means that the two different Fe-Ni phases seen in the CEMS analysis occupy the same lattice. The X-ray photographs do also show the presence of superstructure reflections from the ordered FeNi phase, and that the orientation of the f.c.c. lattice is the same within the whole sample (surface area ~ 50 mm^2).

As in the CEMS analysis the X-ray diffraction analysis does also show the presence of more compounds. Some of the X-ray photographs (mostly from near-rim regions) show a weak diffraction pattern from a ''powder compound'' with f.c.c. structure and a lattice parameter of a $\simeq$ 8.4Å, and some show two weak reflections, which can be interpreted as coming from an epitaxially grown compound with f.c.c. structure and a lattice parameter of a $\simeq$ 8.4Å. These two diffraction patterns may belong to the same or to different compounds. The data obtained suggest that the most probable candidates are Fe_2NiO_4 and Fe_3O_4, and this interpretation is in accordance with the CEMS analysis.

THE COLONY METEORITE AND THE POSSIBLE EXISTENCE OF A NEW CHEMICAL SUBGROUP OF CO3 CHONDRITES

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The Colony meteorite, found in Oklahoma around 1975, has an unrecrystallized texture and contains heterogeneous olivine and low-Ca pyroxene, kamacite with low Ni and Co and high Cr, amoeboid inclusions with low FeO and MnO, and numerous small chondrules with clear pink glass. These characteristics are shared by members of the least metamorphosed subgroup of CO3 chondrites. Colony contains a fine-grained matrix that has higher FeO (46.0 wt. %) and