Minerals

PS08.02.01 Rietveld-refinements and temperature-dependent Moessbauer spectroscopic investigations of synthetic C2/c clinopyroxenes. G. Amthauer, G. J. Reclhanm1er, W. Lottem1oser, Institute of Mineralogy, University of Salzburg, Austria

C2/c clinopyroxenes on the binary join hedenbergite [D2/c](Ni2+Fe3+)2Si2O6-Fe3+SiO4-acmite NaFe2+Fe3+Si2O6 were synthesized using standard hydrothermal techniques and investigated by means of temperature-dependent Moessbauer spectroscopy between 80 and 700 K, revealing Fe2+ and Fe3+ on the octahedral M1 position only and showing additional resonant absorption with hyperfine parameters intermediate between Fe2+ and Fe3+ above 250 K within the solid solution series, which gains intensity with increasing temperature. This is interpreted as thermally activated electron transfer between Fe2+ and Fe3+. Statistically, Fe2+ and Fe3+ are distributed over eight T sites. The occupation of the T1 site is found to be intermediate between Fe2+ and Fe3+. The magnetic ordering of the Fe2+-Fe3+ system is found to be antiferromagnetic at low temperature and ferromagnetic at higher temperatures.

PS08.02.02 SPINEL FORMATION IN THE MESOSPHERE OF THE EARTH AFTER CRETACEOUS/TERTIARY IMPACT. S. Astarlan, A. Preisinger and L. Petris, Institute of Mineralogy, Crystallography and Structural Chemistry, Tech. University of Vienna, A-1060 Vienna, Geiseidemann 9, AUSTRIA.

Magnetic spinels separated from hemipelagic and pelagic sediments of the Cretaceous/Tertiary (K/T) boundary sections of Bjala, Bulgaria and Cerbara, Italy were analysed by X-ray powder diffraction and by a scanning electron microscope equipped with a microprobe.

65 million years ago Bjala was located at a distance of about 10000 km and Cerbara about 8000 km from the impact structure in Yucatan, Mexico. It is proposed, that the spinels found in the K/T boundaries are formed as re-condensed material of a hot fireball induced by the impact in the mesosphere of the Earth at an altitude of ~80-100 km.

The spinels were extracted with a strong magnet from a suspension of the K/T boundary clay. The spinels were crystallized as octahedra in the range of 1-20 μm in sizes. The magnetic minerals at both sites are principally nickel-rich (Ni1+1%) magnesioferrite spinels with strong variation in the chromium content (0-10% Cr2O3). The octahedral from the K/T boundary sediment from Cerbara show a lower Cr content with lattice parameter of 8.366Å than those of the larger particles (3-20 μm) from Bjala with lattice parameter of 8.345Å. However, the smaller particles (1-3 μm) from the latter site show lower Cr content. The octahedral faces of the large particles of Bjala show etch pits. This etching could be a consequence of sulphuric acid rain following the K/T impact.

PS08.02.03 STRUCTURAL VARIATIONS IN THE ZEOLITE PAULINGITE. A. Bienia, W. Joswig and W.H. Baur, Univ. Frankfurt, Institut f. Kristallographie, Senckenberganlage 30, 60054 Frankfurt, Germany.

The Ca- and Ba-rich forms of paulingite were studied by X-ray single crystal methods. The refinements converged to R 0.085 and 0.077. This is the first structural information on chemically different paulingite crystals since introducing this natural zeolite and its complicated aluminosilicate crystal structure in 1966. Paulingite is a medium pore size zeolite constructed from 7 different cages (ope, gaa, pau, plg, cpo, ota, gen). The access to all cages is controlled by plane or deformed single eight rings (SSR). Preferred cation sites are the saddle shaped SSR openings from the open double eight rings (oto) to the pau cages (K1) and the compressed pau cages (cpa) (Bal. K2). Two strong bonds to framework oxygen atoms and four to water molecules are possible at this site. The plg cages are stuffed by Ca cations coordinated by eight water molecules. An additional cation position occupied by K is located in the big channel of the structure in the SSR connecting the two rhombohedral cavities (gaa) with a double eight ring (opr). All other cages are stuffed with highly disordered and weakly bonded water molecules. The Si and Al atoms (ratio 2.9) are statistically distributed over 8 different T sites. The individual T-O distances of 1.64 Å (±0.01 Å) and (±0.02 Å), and the T-O-T angles of 146° (±3°) and 145° (±3°) respectively, show that the different cation populations in the pores do not affect the geometry of the framework of paulingite appreciably. The narrow distribution of the T-O-T angles shows that the framework is relaxed compared with the width range of T-O-T angles observed in zeolites at large (116° to 180°).


PS08.02.04 THE INTERMEDIATE MEMBERS OF WAGNERITE/ZWIESLEITE MINERAL SERIES. Dimitrina M.T., Fin'ko V.I., IGEM Russian Acad.Sci. Staromosetny 35 Moscow Zh-17 109017 Russia.

The X-ray diffraction study of two ferroan wagnerite samples from Kyakhtka (Russia) have been carried out with the intention to clarify the crystalchemical relationship between rather rare minerals: wagnerite Mg2P2O7F, ferroan wagnerite(Mg,Fe)2P2O7 F, triplite (Mn,Fe)2P2O7 F, magnetirotiroplite (Mn,Fe)2P2O7 F, and zwieselite Fe3P2O7 F. In spite of the fact, that all these minerals are characterized by the same general formula M2n+PO4(FOH), (where Me=Mg2+, Fe2+, Fe3+, Mn2+) the crystal structure data reported by different authors have not shown the identity of all these structures. According to the chemical composition the two ferroanwagnerite (Mg1.33Fe0.13Fe0.13Mn0.01)PO4(F0.95OH0.07) and (Mg1.17Fe0.2Mn0.63)PO4 are the intermediate members of wagnerite-zwieselite series. The long exposure experiment of the ferroan wagnerite permitted to register the faint reflections at low angle area, which had not been observed by previous studies and the conclusion was made, that the ferroan wagnerite distinguishes from wagnerite and is identical with magnetirotiroplite. This study showed that namely these samples belong to the wagnerite group rather than to magnetirotiroplite one.