There are believed to be caused by scattering from the surface layers of the crystal, where loss of potassium to the environment during the high temperature synthesis might cause an increase in c consistent with the behaviour of the R3c phase. Weissenberg photographs of other K8βO3 crystals have shown yet another trigonal phase with a = 5.37 Å, that gives diffuse diffraction spots.

PS-08.01.28 THE CRYSTAL AND BOND STRUCTURE OF C4H12N· CaF2. By Qi-jun Yu*, Xiufeng Ji, Bing Jin, and Chun Shen, Department of Materials Engineering, Wuhan University of Technology, Wuhan, China.

C4H12N· CaF2 is an important constituent in Portland cement clinker containing fluorine, but its crystal structure and characteristics have not been thoroughly studied so far. C4H12N· CaF2 single crystals in a state of trigonal tristetrahedron of 40~120 μm have been prepared for the first time by flux evaporation growth method. A cubic structure, cell dimension of 11.981 (2) Å, molecular number of two, theoretical density of 2.72 g/cm³, space group of I43d and atomic coordinates were observed as well. The calcium atoms were found to be coordinated either to six oxygen in a very asymmetric manner or to six oxgens and one fluorine in an arrangement similar to distorted octahedral coordination, and the aluminium atoms coordinated to four oxgens in an arrangement of [AlO4] tetrahedron which make up a three-dimensional network. The formation mechanism and the strength of Al—O chemical bond were analyzed by approximate quantum chemical calculations. From above results we have determined the relations between the structure and hydration activity of C4H12N· CaF2 from the understanding of crystal structure and chemical bond.

PS-08.01.25 FRACTAL IN LASER-INDUCED CHEMICAL VAPOR DEPOSITION OF SILICON POWDER. By W. X. Wang, D. H. Li, Anhui Institute of Optics and Fine Mechanics, Academia Sinica, Hefei 230031, P. R. China, and Structure Research Lab. of University of Science and Technology of China, Hefei 230026, P. R. China, Z. C. Liu, Anhui Institute of Optics and Fine Mechanics, Academia Sinica, Hefei 230031, P. R. China, J. Y. Xing, Z. H. Wai, Structure Research Lab. of University of Science and Technology of China, Hefei 230026, P. R. China.

Since the concept of fractal was proposed by Mandelbrot[1], this concept has been applied to a lot of disciplines[2]. In this article the fractal phenomenon in laser-induced chemical vapor deposition (LICVD) of Si powder is reported. The Si powder was synthesized by LICVD of SiH4 and H2. Only under certain conditions (cell pressure 200~400 Torr; gas flow rates 50~120cm3/min; and silane concentration, 5~10%) the fractal phenomenon can occur. The fractal structure is observed by transmission electron microscope (TEM). Fig. 1 is the typical picture of the fractal structure. Fig. 2 gives the corresponding transmission electron diffraction (TED) diagram. It can be seen clearly that the Si sample is crystalline. Fig. 1 indicates that the fractal structures with fingering-like are composed of small crystallite with triangle-shape, and the small crystallite size is about 0.1 μm.

The fractal dimensions are calculated by box method[3], and the fractal dimension is 1.75. The experimental results showed that the fractal structure was grown during the initial stage of LICVD of Si powder, where the thermodynamic condition was unequilibrium.

Reference: