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## The modulated structure of the holographic data storage material $\text{Sr}_x\text{Ba}_{1-x}\text{Nb}_2\text{O}_6$ investigated by neutron and x-ray diffraction

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$\text{Sr}_x\text{Ba}_{1-x}\text{Nb}_2\text{O}_6$  ( $0.25 < x < 0.75$ ) (SBN) is a very attractive material for technological applications and basic research, because of its high electro-optic and pyroelectric coefficients and its favourable photorefractive properties [1]. The phase transition from the paraelectric phase to the ferroelectric phase occurs between 30(C and 200(C (depending on the composition) and is of relaxor-type. We investigated the modulated structures for different compositions  $x$  using x-ray and neutron diffraction. The incommensurate structures have been solved [2,3] and refined in five dimensional superspace with the tetragonal super-space group  $P4bm(pp1/2, p-p1/2)$  using the program package Jana2000 [4]. The origin of the modulation is a rotation and tilting of the oxygen octahedra. The amplitude of the modulation increases as a function of the strontium content  $x$ . The whole refinement uses only first-order modulation waves, as only first order satellites have been measured. There are strong indications that for a complete solution the use of higher-order satellites and a more complicated model is necessary.

- [1] A. M. Prokhorov and Yu. S. Kuzminov, *Ferroelectric Crystals for Laser Radiation Control*, A. Hilger (Ed.) Bristol (1990).  
 [2] Th. Woike, V. Petricek, M. Dusek, N. K. Hansen, P. Fertey, C. Lecomte, A. Arakcheeva, G. Chapuis, M. Imlau, R. Pankrath, *Acta Cryst. B* 59, 28 (2003).  
 [3] D. Schaniel, J. Schefer, V. Petricek, M. Imlau, R. Pankrath, T. Granzow, T. Woike, *Appl. Phys. A* 74, S963 (2002).  
 [4] V. Petricek, M. Dusek, L. Palatinus, *The crystallographic computing system Jana2000*, Institute of Physics, Praha (2000).

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## Arteriosclerotic Aorta Calcifications characterized by TEM and Electron Crystallography

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Vascular calcification is a common finding in arteriosclerosis and a serious concern in treatment of diabetic and uremic patients due to its high mortality risk about ten to twenty times higher than for the average population. Arteriosclerosis in the case of uremic patients is characterized by significant calcification of arteries and heart valves. However, the initial mechanism and the progression of the calcification are still not fully understood and therefore matter of current research. In the attempt to shed more light on the mechanism of calcification small segments of human arteriosclerotic arteries (aorta, *A. ilica*) have been isolated and subsequently investigated by TEM. The main scope of the work includes studies on the crystal structure and analysis of the chemical composition of initial vascular calcium deposits with special focus on the supposed differences between media- and intima calcification, because both have been observed for uremic patients.

A selected area electron diffraction pattern of a typical calcification as isolated from human arteriosclerotic arteries is shown below. Indexing of the corresponding intensity profile shows that the pattern is compatible with hydroxylapatite [refined lattice parameters  $a = 9.35(3)$  Å,  $c = 6.89(2)$  Å, space group  $P6_3/m$  (no. 176)].

