LiB<sub>x</sub> – An Incommensurate Composite Structure at Low Temperatures. M. Wörle*, R. Nesper*, T. Chatterji†, *Laboratory of Inorganic Chemistry, ETH Zürich, Universitätstr. 6, CH-8092 Zürich; †Institut Laue Langevin, BP156, F-38042 Grenoble Cedex 9.
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The lithium boride LiB<sub>x</sub> (0.82<x<1.0) the first boride known to contain linear boron chains, isoelectronic to carbyne which are embedded and stabilized in a lithium matrix. Indeed, this compound contains a surprising solution to the famous carbyne problem. At room temperature the boron chains are disordered, giving rise to diffuse scattering in the corresponding X-ray and neutron powder diffraction patterns. At about 150 K a second order phase transition takes place which leads finally to the formation of an incommensurate composite structure. The crystal structures at 2 K of both sublattices were determined from the neutron diffraction experiment and refined in the space group P–1(αβγ).

New incommensurate misfit layer oxides in the system (Bi, Ca, Co, O). S. Lambert, H. Leligny, D. Grebille, Lab. CRISMAT (UMR CNRS 6508), ISMRA, 14050 CAEN Cedex.
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Recently, a new family of oxide composite structures has been discovered in the [Bi-(Sr,Ca)-Co-O] and [Tl-(Sr,Ca)-Co-O] systems and characterized by E.M. and EXAFS observations. It shows strong analogies with the well known family of misfit layered chalcogenides (MX)_1+x(TX<sub>2</sub>)<sub>m</sub> with the alternate stacking along c of pseudohexagonal layers and rock-salt type layers, sharing the same a parameter but exhibiting two incommensurate periodicities along b.

A first structural study of the [Bi<sub>0.87</sub>SrO<sub>2</sub>][CoO<sub>2</sub>] phase in the 5D superspace formalism was carried out using single crystal X-ray diffraction data.

A more systematic investigation of these families has been carried out. Single crystals and powder samples of the prototype phase Ca<sub>3</sub>Co<sub>4</sub>O<sub>9</sub> and of a Bi substituted phase (Bi<sub>0.11</sub>Ca<sub>3</sub>Co<sub>3.7</sub>O<sub>9</sub>) have been synthetized. A characterization of the symmetry of these phases will be presented using Weissenberg or precession photographs and synchrotron X-ray diffraction patterns. The symmetry of the Bi free phase is monoclinic (a= 4.85Å, b=4.55Å, c=10.74Å, β=98°) and the sample presents a twinning phenomenon. Some extra reflections are observed in the common (a*,c*) plane and can be explained assuming an intrinsic modulation within the RS sublattice. The Bi substituted phase, in spite of a weak substitution rate and of very close values of the cell parameters, shows a different orthorhombic symmetry. A first description of this structure is proposed.