coordinated Ti^{+4} ions. The structure can be described as being made up of chains of Ti^{+4} octahedra surrounding Ba^{+2} filled pentagonal tunnels, $[\text{Ba}_2\text{Ti}_80_{20}]^{-4}$ alternating with chains of $[\text{Nd}_4\text{Ti0}_7]^{+2}$ held together by the $[\text{Ba}_x(\text{Nd},\text{Sm})_{2/3-2/3x}]^{+2}$ ions. Alternately, it can be described as corner shared groups of perovskite-like molecules of $[\text{Nd}_4\text{Ti}_90_{27}]^{-6}$ containing three kinds of tunnels, pentagonal Ba^{+2} , diamond shaped $[\text{Ba}_x(\text{Nd},\text{Sm})_{2/3-2/3x}]^{+2}$, and vacant triangular sites.

High resolution electron microscope lattice images taken down the <u>c</u>-axis show a "herring-bone weave" pattern, with angles near 60°. All postulated structures based on the 1:1:5 composition shown calculated lattice images with 90° angles. However, calculated images based on the present structure agree with the observed. group I4). Barium atoms are surrounded by nine oxygen atoms achieving a very distorted polyhedron. The acetate ligands are involved in two kinds of coordination scheme as shown on the figure :



07.9-10 STRUCTURAL PRECURSORS IN THE SOL-GEL PROCESSING OF BatiO₃.

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Sol-gel processed $BaTiO_3$ is prepared from barium acetate and tetraethoxy titanium(IV) in glacial acetic acid and ethanol. The so-obtained gel is dried and heat-treated until $BaTiO_3$ recrystallises at 650°C.

Three domains of temperature can be considered on the basis of a LAXS study of the amorphous solid (LAXS: Large Angle X-ray Scattering):

1) Below 250°C, there is no important change in the local order. This domain corresponds to a loss of solvents.

2) Between 250°C and 400°C, there is still a loss of solvents and the organic ligands begin to decompose.

3) Between 400°C and 600°C, the transformation of the amorphous solid is very fast, corresponding to the formation of new products. The modelling of the high temperature (600°C) solid shows that BaTiO₃ crystallises from a mixture of "native" barium carbonate and titanium dioxide.

The aim of the present study is to define the structural precursors in the room-temperature gel. Titanium might be present as an hexanuclear species $Ti_6 (\mu_3-O)_2 (\mu_2-O)_2 (\mu_2-OC_2H_5)_2 (\mu-CH_3COO)_8 (OC_2H_5)_6$, built up of two trinuclear oxo-centered units. This complex crystallises in the triclinic system (space group P1). The metal-oxygen-metal bridging scheme is highly asymmetrical. This asymmetry results in a great dispersion in the Ti-Ti distances and in the Ti-(μ_3 -O) bonding(I. Gautier-Luneau et al., Z. Krist., in print).

Barium might be present as the $Ba(CH_3COO)_2$ acetate or a solvate like $Ba(CH_3COO)_2$. x CH_3COOH . y H_2O . The crystal structure of the first compound has been determined. It crystallises in the tetragonal system (space

07.9-11

$U_{14}Au_{51}$, A NEW PHASE IN THE SYSTEM U - Au.

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The published phase diagram of the system U-Au only shows two intermetallic compounds: U_2Au_3 and UAu_3 . We synthesized the new phase $U_{14}Au_{51}$ and found its structure to be of the GdAg_{3.6} type. Some speculations about this structure type will be offered.