DEPOSITION OF $BaTiO_3$ LAYERS BY INJECTION MOCVD

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$BaTiO_3$ layers were deposited by injection MOCVD using a mixed Ba_2Ti_2 precursor dissolved in hexane. These films have been deposited at different temperatures between 600°C and 800°C. The microstructural properties of these films obtained on different kinds of substrates (MgO (100), $LaAlO_3$ (012), sapphire (1-102), Si (100), Pt on Si and $YBa_2Cu_3O_7$ (YBCO) on $LaAlO_3$) are compared.

INTRODUCTION

Thin ferroelectrics have been extensively investigated for possible use as ferroelectric memories, detectors, transducers, optical devices and superconductor-ferroelectric devices. $BaTiO_3$(BTO) offers a range of attractive properties such as a very high dielectric constant and a nonlinear optical susceptibility. The deposition techniques employed include molecular-beam epitaxy (1), evaporation (2), sputtering (3), metalorganic deposition (4), sol-gel (5), and chemical vapor deposition (6). Of these techniques, metalorganic chemical vapor deposition (MOCVD) is very promising for the eventual commercial production of films. The potential advantages of MOCVD over other thin film growth processes include deposition over large areas, high throughput, and uniform coverage of nonplanar shapes. Epitaxial films of BTO have been grown by MOCVD on (100) surfaces of single crystal $LaAlO_3$, MgO and $NdGaO_3$.

In this letter, we report on the *in situ* epitaxial growth of BTO thin films on different kinds of substrates by thermal injection MOCVD at substrate temperatures between 600°C and 800°C.

EXPERIMENTAL

Precursor

The mixed-metal species $Ba_2Ti_2(thd)_4(OEt)_8(EtOH)_2$ (fig.1) was prepared according to the literature (7) by reacting titanium ethoxide and barium tetramethylheptanedionate in hexane; crystallisation was achieved by adding ethanol.

Its structure is based on a rhombus, the various metals being linked via doubly and triply bridging ethoxide ligands. Each metal bears a chelating tetramethylheptanedionate ligand. Titanium is six coordinate while barium is seven-coordinate due to the coordination of an ethanol molecule.

The compound is air sensitive, soluble in hydrocarbons (hexane, toluene), less soluble in ethanol and dissociation is observed in diglyme.