

Preparation of PbTiO_3 Thin Films by CVD Using a Mixture of Metal-organic Solid Source

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Recently much attention has been paid to the thin films of ferroelectric materials. Ferroelectric thin films have been widely applied in capacitors of DRAM and FRAM and various sensors due to their useful ferroelectric properties. However, the growth of multicomponent ferroelectric oxide films by conventional metal-organic vapor deposition technique has been hampered by a lack of stable solid metal organic sources.

Various alternative precursor delivery processes have been designed specifically to circumvent the low volatility and low thermal stability problems associated with solid metal organic sources. The first method involves the dissolution of metal organic precursors in solvents such as butylacetate, THF, toluene, decane and supercritical carbon dioxide. According to this process, termed Liquid Delivery System, the multicomponent precursor solution is atomized or vaporized into a carrier gas stream or directly into the reaction chamber, with deposition occurring on a heated substrate.

In a different approach, we used a method whereby a mixture of the solid metal-organic precursors is flash-sublimed into the MOCVD chamber to obtain reproducible transport of metal components to the film growth surface.

In this study, PbTiO_3 thin films were deposited by CVD technique using a mixture of metal-organic solid sources and their growth behavior, composition, micro-structure were characterized.