Abstracts

High Purity Ferroelectric Materials by Sol-Gel Process for Microwave Applications

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Ferroelectric materials (FEM) have a dielectric constant which can be modulated at high frequencies (up to the optical range), under the effect of an electric field bias. The bias is perpendicular to the direction of propagation of the signal. This property is very attractive and can be used to develop a new family of devices operating in the microwave and millimeter range. Among these devices, tunable delay phase shifters for electronically scanned arrays, tunable filters, variable power dividers, are the most promising. The reason FEM materials haven't been used at high frequencies is due to the large bias voltage required to change their dielectric constant, and due to the high losses of the materials. In this paper a new chemical process for the synthesis of high quality low loss thin film and thin ceramics of BaTiO/sub 3/(BTO), Ba/sub x/Sr/sub 1-x/TiO/sub 3/(BST) and PbTiO/sub 3/(PTO) is presented. The high quality of these materials and the use of strontium as a dopant for BTO, or calcium for the PTO helps to reduce the losses. Also use of the Sol-Gel process for deposition of thin film of FEM having thickness below 0.1mm, reduces the required bias voltage below 10V, making these devices fully compatible with analog circuits. Thin film and thin ceramic devices operating up to 3 GHz are presented and characterized as examples.

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