

Non-Confidential Description - PSU No. 2243 "BZN Pyrochlore Thin Films"

Keywords:

Off-chip capacitors, on-chip capacitors, integrated microwave components, microelectronics, cellular phones, ceramic, dielectrics, BZN, thin films

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[U.S. Patent #6,482,527](#)

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Background

The rapid development of communication technologies, especially mobile communication systems, has been greatly facilitated by miniaturization of devices used in such systems. Integrated decoupling capacitors and microwave resonators are of particular usefulness in such systems. Dielectric materials for these applications must possess a moderate to large dielectric constant, low loss tangent, high dielectric quality factor, and a small temperature coefficient of resonator frequency (for resonators). Bismuth-zirc-niobate (BZN) ceramics have previously been developed for low firing temperature multilayer capacitors. Recent studies have shown that some compositions of the BZN class also exhibit excellent microwave properties. Such dielectric properties exhibited by the above BZN system indicate that thin films of this composition may have utility as potential materials for integrated microwave resonators and decoupling capacitors. Thin films may have the advantage of lower crystallization temperatures and smaller device size than bulk ceramics and may be potentially integrated in microelectronic devices.

Invention Description

The disclosed relates to a bismuth-zirc-niobate pyrochlore thin film, abbreviated as "BZN." More particularly, the present invention relates to a process of preparation of such thin films and coated articles that are suitable for use in dielectric applications. The present invention further includes an article comprising a substrate and a thin film comprising a pyrochlore according to the present invention coated on the substrate.

Advantages/Applications

- Relatively large, temperature-stable dielectric constants with small loss tangents
- Controllable temperature coefficients of capacitance
- Electric field tenability of the dielectric constant
- Lower crystallization temperatures and smaller device size than bulk ceramics

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