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Non-Confidential Description - PSU No. 2220
"Bismuth Pyrochlore Microwave Dielectric Materials"

Keywords:

Multilayer capacitors, dielectrics, ceramics, communication systems, microwaves, wireless, cellular, integrated circuits

Links:

Inventor website

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Background

In recent years, communication systems have developed which use microwaves (frequency band ranging from 300 MHz to 300 GHz). These systems include wireless telephones, car phones, cellular phones, satellite broadcasting systems, and the like. As a result, there is an increasing demand for dielectric ceramics with better electrical properties for use components such as resonator devices, band pass filters, and microwave integrated circuits.

Bismuth-based pyrochlores have recently become of interest for use as high frequency dielectric materials. One basis for this interest is that they can be fired at low temperatures. In contrast to conventional microwave dielectric materials which require sintering temperatures of more than 1600 degrees K, Bismuth pyrochlores can be sintered at less than about 1400 degrees K.

For use in microwave communications systems which operate at high frequencies, dielectric materials should have properties such as high dielectric constant ("K"), high quality factor ("Q"), and stable temperature coefficient of capacitance ("TCC"). However, it is very difficult to develop dielectric materials which have a stable TCC as well as high K and high Q. A need therefore continues to exist for a dielectric material which has a high K, a high Q value and a stable TCC.

Invention Description

The present invention provides bismuth perchlore dielectric materials which have both high K and high Q, and which can be fired at low temperatures such as less than about 1000 degrees C. These compounds typically have a high K, high Q, a low TCC, and low temperature coefficient of resonant frequency ("TCF") over the frequency range of 1 MHz-28 GHZ, and can be sintered between about 850 degrees C to about 1000 degrees C, preferably between about 850 - 950 degrees C.

Advantages / Applications

- High dielectric constant, high quality factor, stable temperature coefficient of capacitance
- Can be sintered at lower temperatures (preferably between about 850 - 950 degrees C)

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