Increased thermal stability and dielectric properties of composites formed from $Ba_2TiSi_2O_8$-TiO_2

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This work investigated composites formed from Ba2TiSi2O8 (BTS) with addition of TiO2 in the radiofrequency (RF) and microwave (MW) region. Structural characterization was performed using X-ray diffraction (XRD) and the phases were confirmed by Rietveld refinement. The morphology of the materials was analyzed by scanning electron microscopy (SEM). Nyquist diagrams were fitted employing an equivalent circuit using two R-CPE associations related to grain and grain boundary effects. The study of the dependence of AC conductivity with frequency at different temperatures demonstrated that the conduction process is thermally activated. To analyze the dielectric properties of the composites in the MW region, the following methods were used: Hakki-Coleman, Long, Macllister and Shen [3 – 4], Silva-Fernandes-Sombra (SFS) [5], and through these the following values of permittivity εr (11.00 – 19.80), loss tangent tan δ (0.0455 – 0.00347) and resonant frequency temperature coefficient τf (-47.00 – +6.29 ppm/^{o}C). This analysis revealed that the addition of TiO2 provided improvement in the electrical properties of the BTS ceramic matrix, showing relevant growth for applications in devices that operate in the RF or MW region.

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