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Structural, electrical, and dielectric properties of $Mg_{0.8}Ba_{0.2}Al_2O_4$ ceramic fabricated by gel-combustion route

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In this research, the structural, electrical, and dielectric properties of $Mg_{0.8}Ba_{0.2}Al_2O_4$ nanocrystalline ceramic were investigated. The ceramic was synthesized by gel-combustion method. Different techniques such as X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy–energy dispersive X-ray spectroscopy (SEM–EDX), surface area analyzer (BET), and impedance spectroscopy were used to study the structural, microstructural, morphological, electrical, and dielectric properties of the prepared $Mg_{0.8}Ba_{0.2}Al_2O_4$ ceramic. In particular, the magnesium aluminate ($MgAl_2O_4$) has well known for its normal spinel structure. The physical properties of the magnesium aluminate system are more suitable for microwave device fabrications. The insulating properties of spinel aluminate materials favor various applications by way of catalyst, catalyst support and intrinsic dielectric materials, chemical attacks towards the high resistive integrate electronic circuits and also act as a good refractory material. The distinct dielectric properties possessed by the magnesium aluminate system make it more suitable for microwave and microelectronic devices [1]. Padmaraj et al. reported a specific surface area of 162.704 m^2/g for the prepared $MgAl_2O_4$ nanocrystalline powder in their research.While using a new and affordable sol-gel method, Habibi et al. were able to report a spinel with a high specific surface area of 264 m^2/g at low temperature [2]. Additionally, the nanocrystalline $MgAl_2O_4$ pellet was found to have a calculated conductivity value of 4.9213×10^{-13} S cm^{-1}[3].

Keywords: Gel-combustion, Electrical properties, Structural properties, Ceramic

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