

SOL-GEL PREPARATION & CHARACTERIZATION OF ZnCaAl₂O₄ CERAMIC NANOPARTICLES

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ABSTRACT

Microwave dielectric materials are well-recognized for their broad application in communication from satellite to ground. The advantages of dielectric materials lie in scaling down the device and the controlled dielectric permittivity. However, the growing world of communication is expanding its operating frequency for the global position satellite (GPS). Presently, the trend of miniaturization of patch antenna has been demanded to fulfill the requirement of the GPS system. In this perspective, dielectric ceramic materials have got recognized due to the tunability of dielectric permittivity and quality factor to a great extent. In this work, we report the synthesis and characterization of ZnCaAl₂O₄ ceramic nanoparticles for their application as the patch antenna material.

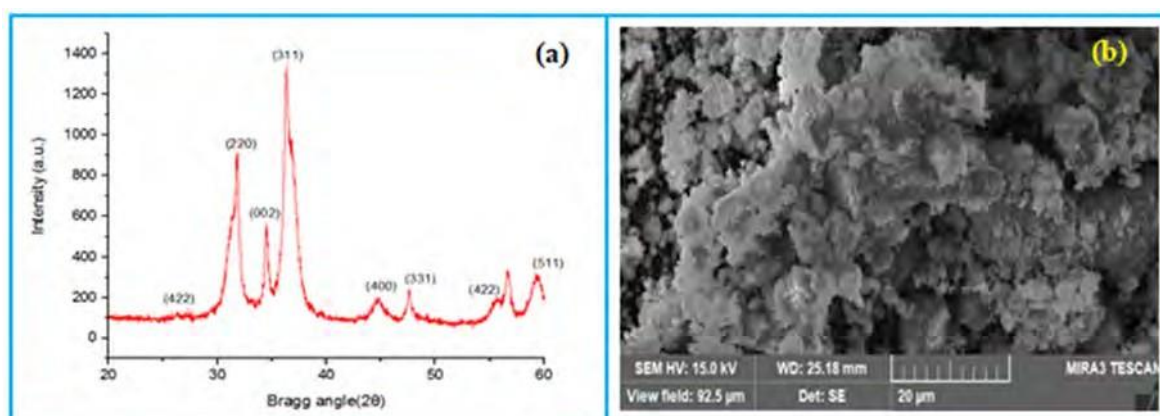


Figure 1. XRD pattern and FESEM image of ZnCaAl₂O₄ ceramic nanoparticles.

Figure 1(a) shows the sol-gel derived ZnCaAl₂O₄ microwave dielectric ceramic nanoparticles which evidenced the crystalline phase of standard face-centered cubic of ZnCaAl₂O₄ and coincides with JCPDS file No.01-087-0265. Figure 1(b) shows the preparation of spherical nanoparticles which are agglomerated. Further, we have explored the FTIR investigation to study the functional groups in the prepared nanoparticles, EDS spectroscopy to examine the compositional elements and dielectric properties.