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# DIELECTRIC PROPERTIES OF ZINC ALUMINIUM-SILICATE BASED CERAMIC NANOPARTICLES

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## ABSTRACT

Zinc aluminate ($ZnAl_2O_4$) is a class of spinel group which has unusual characteristics and recognized as the microwave dielectric ceramic. The composite materials based on $ZnAl_2O_4$ and $SiO_2$is expected to improve the dielectric properties. In this work, we present the synthesis and investigation of $ZnAl_2O_4$-$SiO_2$ ceramic nanoparticles for microwave applications.

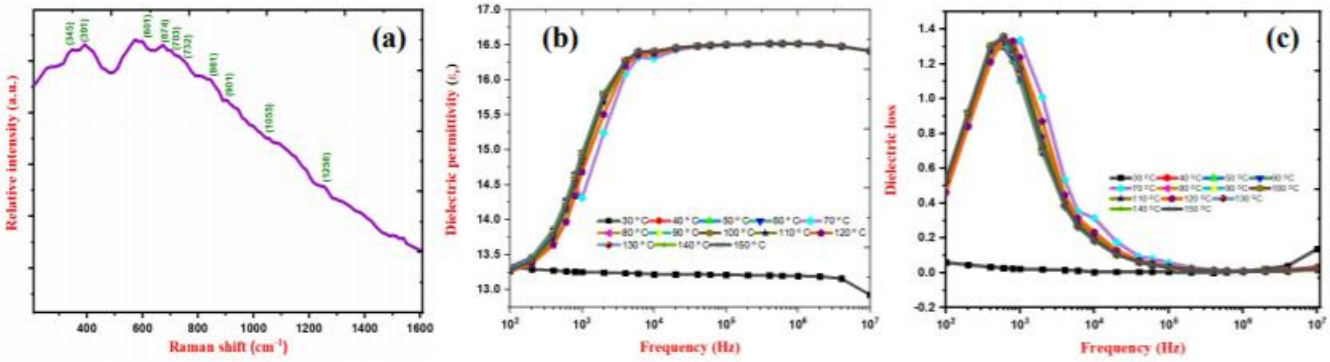


**Figure 1. (a) Raman spectroscopy, (b) Dielectric permittivity and (c) Dielectric loss of $ZnAl_2O_4$-$SiO_2$ ceramic nanoparticles.**

Figure 1 (a) depicts the Raman spectra of $ZnAl_2O_4$- $SiO_2$ ceramic nanoparticles. We can observe the $TiO_2$-Eg modes originated at 143 cm-1 and 631 cm-1 along with a peak at 391cm-1 ascribed to the B1g mode of $SiO_2$. We have examined the dielectric permittivity and dielectric loss as depicted in Figure 1(b) and Figure 1(c). We can notice almost constant dielectric permittivity at room temperature with the increased frequency. Further, an increased permittivity was observed with the increased frequency at increased temperature from 40-150 $^oC$. In a similar fashion, one can notice the decreased dielectric loss in higher frequency regime at increased temperature from 40-150 $^oC$. Further, we explore the conductivity and impedance properties of $ZnAl_2O_4$-$SiO_2$ nanoparticles in the view of their applicability as the microwave ceramic material.

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