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Dielectric, ferroelectric and impedance spectroscopicstudy of Ta_2O_5, Sb_2O_5, and V_2O_5-doped $AgNbO_3$ ceramic

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Abstract: In this work, silver niobate ($AgNbO_3$) was doped withX_2O_5 (where,X = Ta, Sb, and V) and the series of samples were prepared by the solid state route.Phase analysis was carried out by the X-ray diffraction technique and the image of the surface morphology of each sample was taken by the Field emission scanning electron microscopy.Complex impedance spectroscopy was used to distinguishthe differentmicrostructure contribution in the conduction mechanism. Relaxation behaviour was observed in the imaginary part of impedanceZ"(f) and electric modulus M"(f). The appearance of single semicircle in Cole-Cole of (Z' vs. Z") and (M' vs. M") confirmed a single relaxation process which was identified due to the intrinsic (grain) effect. The absence of any extrinsic interfacial conductionsuggested that charge carriers at grain boundaries and sample surface are not activated properly.Therefore, it was presumed that no effective role by the metallic precipitated silver nano particles in electric properties within the chosen temperature range (25^oC – 450^oC) containing major dielectric anomalies. The changes in the dielectric and ferroelectric behaviours were also discussed accordingly.

***Key words*:**ceramics, dielectric response, ferroelectrics, electrochemicalImpedance spectroscopy

1. Introduction.

Recently, a family of Ag-based oxides Ag_3PO_4, Ag_2CO_3, $AgVO_3$, $AgGaO_2$, Ag_2CrO_4, $AgNbO_3$ etc. has attracted particular interests due to their ability to split water, as well as decompose organic contaminants both in air and aqueous solution [1-5]. Among them, $AgNbO_3$ was a highly