

**EFFECT OF ZnO ON DIELECTRIC PROPERTIES AND ELECTRICAL
CONDUCTIVITY OF TERNARY ZINC MAGNESIUM
PHOSPHATE GLASSES**

S. F. Khor , Z. A. Talib , W. M. Daud, and B. H. Ng
*Department of Physics, Faculty of Science, University Putra Malaysia,
43400, UPM, Serdang, Selangor*

ABSTRACT

Five different compositions of the ternary system $(\text{ZnO})_x(\text{MgO})_{30-x}(\text{P}_2\text{O}_5)_{70-x}$ containing 8, 10, 13, 15 and 18 mol % of ZnO have been prepared by melt quenching technique. The complex permittivity studies were presented in the frequency range of 0.01 Hz to 1 MHz and over the temperature range from 303 to 573 K. The empirical data has been analyzed by mean of curve-fitting technique based on Havriliak-Negami model. Small broad dipolar relaxation peak is well described at frequencies between 10^3 - 10^6 Hz within the range of temperatures studied while at low frequency the spectrum is dominated by dc conduction which was evidence by ω^{-1} slope in the loss factor versus frequency plot. With increasing ZnO concentration, the dielectric (ϵ') and dielectric strength (ϵ'') both show an increasing trend while the dc conduction behaved in the opposite direction. The excessive zinc ions occupying interstitial position rather than substitutional position among the glassy network have been suggested to be the reason behind the declining values of the dc conduction. These results are discussed in light of the structural change on account of modification effect and Zn^{2+} ions tending located in the interstitial position within the glassy matrix rather than participate in the network.

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