

# Electrical and Structural Properties of PVDF/MgO (7%) Nanocomposites Thin Films at Various Annealing Temperatures

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**Abstract**—Poly (vinylidene fluoride)/nano-magnesium oxide (PVDF/MgO) film with 7% MgO loading percentage was annealed at various annealing temperatures ranging from 70°C to 150°C. The PVDF/MgO thin film was fabricated using spin coating technique with a metal-insulator-metal (MIM) configuration. The dielectric and electric properties of PVDF/MgO with respect to annealing temperatures was studied. The PVDF/MgO nanocomposites thin films annealed at temperature of 70°C (AN70-PVDF/MgO) showed an improvement in the properties; dielectric constant value of 26 at 1 kHz frequency compared to un-annealed sample (UN-PVDF/MgO), which is 21 at the same frequency. As the annealing temperatures were increased from 90°C (AN90) to 150°C (AN150-PVDF/MgO), the dielectric constant values were found to gradually decreased from 25 to 12 respectively, which was lower than the UN-PVDF/MgO thin films. AN70-PVDF/MgO also produced relatively low tangent loss ( $\tan \delta$ ). The resistivity value of AN70-PVDF/MgO was also found to increase from  $3.08 \times 10^4 \Omega \cdot \text{cm}$  (UN-PVDF/MgO) to  $4.55 \times 10^4 \Omega \cdot \text{cm}$ . The increased in the dielectric constant, with low tangent loss and high resistivity value suggests that 70°C was the favorable annealing temperature for PVDF/MgO film suitable for the application in electronic devices such as low frequency capacitor.

**Index Terms:** PVDF, Nanocomposites, Dielectric, Resistivity, ATR-FTIR