

**THE DIELECTRIC CONSTANT ($\epsilon_r = \epsilon'_r - j\epsilon''_r$) AND LOSS TANGENT
($\tan \delta = \epsilon''/\epsilon'$) OF DIFFERENT THICKNESSES OF 70%
THERMOPLASTIC NATURAL RUBBER-30% YTTRIUM IRON
GARNET ($Y_3Fe_5O_{12}$) COMPOSITE**

NOOR AZLEEN BINTI AZMI

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ABSTRACT

THE DIELECTRIC CONSTANT ($\epsilon_r = \epsilon'_r - j\epsilon''_r$) AND LOSS TANGENT ($\tan \delta = \epsilon''/\epsilon'$) OF DIFFERENT THICKNESSES OF 70% THERMOPLASTIC NATURAL RUBBER-30% YTTRIUM IRON GARNET ($Y_3Fe_5O_{12}$) COMPOSITE

Thermoplastic natural rubber (TPNR) was prepared by melt-blending of polypropylene (PP) and natural rubber (NR) in weight percentage ratio of 70:30 using internal Rheomixer. Sample of Yttrium Iron Garnet ($Y_3Fe_5O_{12}$) filled TPNR was prepared at a fixed TPNR content (70% of the total weight). The effect of YIG content with two thicknesses on dielectric constant ($\epsilon_r = \epsilon'_r - j\epsilon''_r$) and loss tangent ($\tan \delta = \epsilon''/\epsilon'$) were studied. Dielectric constant and loss tangent were analyzed using PNA-L Network Analyzer in the frequency range of (8-12 GHz). The homogeneity of sample was verified using Pyris 1 Thermogravimetric Analyzer (Perkin Elmer). The samples prepared were pure TPNR, 2 mm and 5 mm YIG filled TPNR. The dielectric constant for 5 mm sample was higher than that of the 2 mm. On the other hand, the loss tangent for 2 mm sample was lower than that of 5 mm YIG filled TPNR. This composite shows the value of dielectric constant and loss tangent at the X-band. Hence, this research will help in increasing the value of Malaysian second crop which is natural rubber.

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