

**THE DIELECTRIC CONSTANT AND LOSS TANGENT OF
THERMOPLASTIC NATURAL RUBBER (TPNR) FILLED WITH
YTTRIUM IRON GARNET (YIG) COMPOSITES**

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**Final Year Project Submitted in
Partial Fulfillment of the Requirements for the
Degree in Bachelor of Science (Hons.) Physics
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

JULY 2017

ABSTRACT

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Analysis on the dielectric constant and loss tangent at frequency range of 8 – 12 GHz of pure thermoplastic natural rubber (TPNR) and TPNR filled YIG ($Y_3Fe_5O_{12}$) composites microwave absorber was conducted. The TPNR matrix was prepared from polypropylene (PP) and natural rubber (NR) in the ratio of 70:30. A TPNR-YIG composite with 30 wt% of YIG ($Y_3Fe_5O_{12}$) was prepared via a Thermo Haake internal mixer using a melt-blending method and the composite was molded into 6.5cm x 6.5cm dimension and thickness of 5mm using hot press machine. The measurement systems to analyze the dielectric constant and loss tangent of the composite consisted of an Agilent 85070 high-temperature dielectric probe connected via a coaxial cable to a vector network analyzer (Agilent N5230C PNA-L). The homogeneity of the sample was verified from the TGA analysis. The total average value of dielectric constant for pure TPNR is 1.250857426 while the average value of dielectric constant for TPNR-YIG composites is 1.863975494. The total average value of loss tangent for pure TPNR is -0.012809159 and the total average value of loss tangent for TPNR-YIG composites are -0.023298762. Research on the magnetic permeability and the reflection loss properties of the TPNR-YIG composite can be conducted in the future to investigate their absorption properties as microwave absorber.

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