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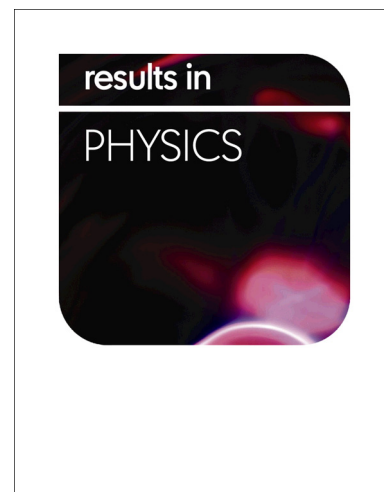
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# Synthesis and characterisation of nickel oxide reinforced with polycaprolactone composite for dielectric applications by controlling nickel oxide as a filler

Ahmad F. Ahmad,<sup>a</sup> Zulkifly Abbas,<sup>a,\*</sup> Sidek Ab Aziz,<sup>a</sup> Suzan J. Obaiys<sup>b</sup>, Mohamad Faiz Zainuddin<sup>c</sup>

<sup>a</sup> Department of Physics, Faculty of Science, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia; E-Mail: ahmadfahad@upm.edu.my; za@upm.edu.my; sidek@upm.edu.my

<sup>b</sup> School of Mathematical & Computer Sciences, Heriot-Watt University Malaysia, 62200 Putrajaya, Malaysia; s.obaiys@hw.ac.uk

<sup>c</sup> Department of Environmental Sciences, Faculty of Environmental Studies, University Putra Malaysia, 43400 UPM Serdang, Malaysia; z\_faiz@upm.edu.my

\* Corresponding author: za@upm.edu.my, Tel:0060173300429

## ABSTRACT

Developing new absorbing and shielding materials with a large band of frequency and high performance to allow the coexistence of the electronic components without the damaging electromagnetic interference (EMI) is needed. This paper is about the development of microwave-absorbing material from polycaprolactone by the addition of nickel oxide. Preparation of NiO/PCL composites to homogeneous were carried out using a Brabender Internal Mixer using the melt blend technique. These composites were characterized using Fourier transform infrared (FT-IR) spectrometry, scanning electron microscopy (SEM) as well using X-ray diffraction (XRD). Dielectric properties were obtained over a broad range of frequency of 8–12 GHz at the room temperature. It is found that the permittivity values increased via NiO filler content increments and decreased with frequency hikes. An instrument of rectangular waveguide is connected to a network analyzer (PNA) and the values of transmission ( $S_{21}$ ) and reflection ( $S_{11}$ ) parameters were measured which were also used for calculating reflection loss, microwave absorption values and the shielding properties of EMI by NiO/PCL composite at X-band frequencies. The measurement results found the material has good EMI shielding application potential as its microwave absorption has shown.

*Keywords:* Absorbing, Electromagnetic interference, Polycaprolactone, Nickel oxide, Brabender

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## 1. Introduction

Usage of working electronic devices in the frequency band of microwave grown rapidly over the few decades, whereas the EMI have immensely increased. Therefore, there are perturbations of large degree produced in electronic systems of military and

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