

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

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 (S21) and reflection (S11) 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.

Keyword: Absorbing; Electromagnetic interference; Polycaprolactone; Nickel oxide; Brabender