Experimental determination of the performance of rice husk-carbon nanotube composites for absorbing microwave signals in the frequency range of 12.4-18 GHz

Abstract

Composites of rice husks and carbon nanotubes (RHC-NTs) are an innovation in improving the absorption of microwave signals. Rice husks, which are an agricultural waste material, have been found to possess a significant propensity for absorbing microwave signals. Studies have shown that both rice husks andcarbon nanotubes (CNTs) have high percentages of carbon. Thus, in this paper, we present the results of our experimental study in which we varied the ratios of rice husks and CNTs in the composite materials and determined the dielectric properties of the composites and measured their abilities to absorb microwave signals. The experimental microwave absorber was fabricated using rice husks and CNTs, which increased the dielectric constant and the loss factor. Complex permittivity was measured using an Agilent dielectric probe. The RHCNT composites were investigated to determine their reflection loss and absorption performance as microwave absorbers. For the fabricated microwave absorber, we used the rectangular waveguide measurement technique to study reflection loss, transmission loss, and absorptionperformance in the frequency range of 12.4-18 GHz. Carbon has an essential role in the absorber due to its ability reflect/absorb microwave signals. Thus, we compared the abilities of a pure rice-husk (PRH) absorber and RHCNT composites absorbers to absorb microwave signals.

Keywords