

Preparation and study on radar absorbing materials of epoxy-Fe₃O₄ composites and the influence of PANI on microwave absorbing properties of NiFe₂O₄/PVB composites

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Microwave absorption properties of epoxy matrix with magnetite fillers were investigated in this work. The composite were prepared via ultrasonic probe sonicator method in solution. The complex permittivity and permeability for epoxy matrix magnetite fillers radar absorbing composites were measured at different microwave frequencies via vector network analyzer. The obtained results describe the frequency dependence of permittivity and permeability with various powder percentage and composite thickness. The reflection loss (RL) of composites was calculated and evaluated from complex permittivity and permeability. The obtained results show that both composites exhibit the large RL and broadband within the frequency range from 1 to 14 GHz for different thickness. The results show that absorption has increased as the fillers rate increase and thickness is decreased. This can be understood based on quarter-wave principle within the frequency range from 1 GHz-14 GHz for different thickness.

The influence of polyaniline on microwave absorbing properties of polyvinylbutiral (PVB)/NiFe₂O₄ composites were investigated in the 1-14 GHz. In this sense, polyaniline (PANI) doped with para-toluene sulfonic acid were introduced into PVB matrix. PVB/filler particles (NiFe₂O₄) composites were prepared with 85/15 mixture ratios via Ultrasonic Probe Sonicator method in solution. The composite of PANI/PVB/NiFe₂O₄ (PANI:PVB = 1:3 and (PANI+PVB):NiFe₂O₄ = 85:15) was prepared via same method of PVB/NiFe₂O₄ composite. complex permittivity ($\epsilon' - j\epsilon''$) and permeability ($\mu' - j\mu''$) of the composites have been measured at different microwave frequencies in 1–14 GHz employing vector network analyzer (Keysight N9926A). The reflection loss (RL) of composites was calculated and evaluated using the theory of the absorbing wall. It was found that the addition of aniline has reduced the reflection loss values but increased the bandwidth within the frequency range from 1 GHz-14 GHz for different thickness.

Biography

Yuksel Akinay is a Research Assistant at Materials Research and Development Center of Karabük University, Turkey. He obtained his Bachelor's degree from Metallurgical and Material Engineering Department, University of Yıldız Technical University, Istanbul, Turkey, in 2010. He has a PhD degree. His research interests include polymer composite materials, nanocomposite, electromagnetic wave absorbing and micro-structure characterization..

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