

Determination reflection and transmission coefficients of lanthanum iron garnet filled PVDF-polymer nanocomposite using finite element method modeling at microwave frequencies

Abstract

In our previous work, the lanthanum iron garnet-filled PVDF-polymer nanocomposite has been prepared. The reflection and transmission coefficients of PVDF/LIG were measured using rectangular waveguide in conjunction with a microwave vector network analyzer (VNA) at X-band frequencies (8 GHz 12 GHz). In this study, the distribution of electric field intensity of PVDF/LIG which was loaded in rectangular waveguide was simulated based on Finite Element Method (FEM) formulation to show the essential differences of intensity of emitted electrical field. The computations of reflection and transmission coefficients of PVDF/ LIG were determined by using implementation FEM modeling rectangular waveguide. The FEM results were compared with the experimental achievement results using the rectangular waveguide. An excellent agreement between measured and simulated results was obtained based on the values of mean relative errors.

Keyword: Finite Element Method (FEM); LIG; Microwave measurements; PVDF; RW-90 waveguide