ABSTRACT

Usage of non-ionizing microwave is very much familiar in various electronic systems, used in both military and commercial arena. In stealth technology, the use of RAM (a material which absorbs microwave radiation in X-band region only) has been ever increasing since its development in the World War-II. But with the lot of advantages, the using of microwave has many limitations too. The problems of using microwaves are many like the interference of microwave to the performance of electronic equipment, microwave information leakage, health hazards etc. The use of microwave absorbing material to solve these problems is a leading technique to the modern researchers. An excellent microwave absorbing material should be thin and light with wide band absorption efficiency. Microwave absorbing material functions by absorbing the microwaves and then dissipates it as heat. Microwave radiation consists of two component namely electric and magnetic field arranged in perpendicular fashion. Dielectric materials are able to interact with the electric field, and magnetic materials are good to interact with the magnetic component of the microwave. Therefore, the microwave absorbing material considerably has been prepared by using dielectric and magnetic materials. Many dielectric and magnetic materials have been used for this particular application, but with the introduction of MWCNT and graphene this field has become one of the most promising fields of this century.

In the present study, attentions have been paid to develop thin, light-weight and wide band microwave absorbing materials in the X-band region based on graphene, MWCNT, conducting polymers and various magnetic materials. To address the effect of magnetic materials in microwave absorption, many new magnetic materials and their composites with graphene and MWCNT have been used to prepare microwave absorbers. The effect of conducting polymers was also investigated. A major disadvantage of conventional dielectric and magnetic absorber is narrow band absorption. To solve this problem, we have projected graphene and MWCNT based nanocomposites for microwave absorption studies. The nanocomposites were prepared in TPU matrix with different filler content through solution blending process and finally fabricated by compression molding technique. Structural, morphological, electrical, thermal, and microwave properties of the prepared absorbers were discussed thoroughly.

Keywords: microwave absorber; graphene; multi wall carbon nanotube; reflection loss; vector network analyzer.