Electromagnetic Wave Absorber RGO/PDMS Polymer Nanocomposite

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Recently, electromagnetic interference **(EMI)** has become a critical problem for electric devices, medical systems, high quality information and safety technologies, etc. **EMI** can degrade the performance of a system or an equipment and in order to solve this problem the development of EMI shielding materials received increasing attention. Due to the wide impact of telecommunications, several economically heavy industrial sectors are likewise eager on the progress of EMI shielding materials. These technological fields demand not only efficient shields, but also properties of materials. For example, chemical and corrosion resistance, lightweight, flexibility, tunable morphology, processing easiness, and inexpensiveness are requirements that materials must fulfill in order to be applicable in flexible electronics or in aerospace and automotive industries [1-2].

Graphite, carbon black and carbon fibers were the first to combine with polymers for the fabrication of EMI shields. After discovery of the unique properties of graphene, new possibilities for research and development of polymer nanocomposites have been opened up. The sphere of application of the innovative polymer nanocomposites produced by using other graphene and carbon nanostructures is enormous, since such nanocomposites can be characterized by extraordinary multifunctional properties [3], which further increases the number of products applied in innovative technologies. Based on the composition and processing complexity, a serious question for mass production of such nanocomposites is how control over the structure, dispersion degree, and morphology will be exercised, so that a material with best properties is produced. In our research, we have synthesized reduced graphene oxide (with good mechanical and electrical properties) for well distribution into matrix.

Polymer nanocomposites obtained by mixing the calculated amounts of Polydimethylsiloxane (PDMS) and reduced graphene oxide (RGO) (Figure 1). The mixture evaporated and dried. Then obtained solid composites used for further research.

As studies show, RGO/Polymer composite absorb energy particularly efficiently in the range of 0.5-6 GHz (Figure 1) which includes: TV broadcasting, GSM, WIFI, 3G, 4G, and 5G irradiation ranges. It is advisable to continue studies to increase the absorption coefficient in the relatively low-frequency range (50 MHz-1 GHz).

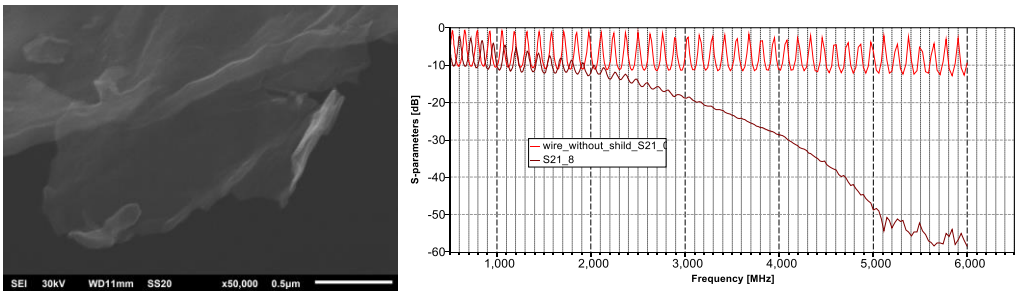

Fig. 1. Micrographs of reduced graphene oxide

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References

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