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Exploration of multifunctional properties of graphene nanoplatelet - epoxy composites reinforced by carbon fibers RICHARD INAKPENU, MARYAM JAHAN, KUO LI, GUANG-LIN ZHAO, Southern University and A & M College, Baton Rouge, Louisiana — We explored the multifunctional potential of graphene nanoplatelet (GNP) - epoxy composites reinforced with carbon fibers (CF) as new electromagnetic (EM) wave absorption and structural materials. The GNP loading was controlled from 3 to 7 wt.% in the fabricated composite samples. We measured and analyzed the tensile strength, hardness, and the microwave (MW) absorption properties of the composites. The microwave measurements were done over a frequency range of 26.5 - 40 GHz in the R-band. The microwave absorption ratio of the composites strongly depends on the GNP loading in the material. A high MW absorption ratio up to 72% was attained for the sample with 7 wt.% GNP loading at high frequency \sim 40 GHz. The results of mechanical measurements show an increase in tensile strength with increased GNP loading in the composites. The tensile strength was increased from 85.9 ± 17.4 MPa for the sample without GNP, to 109.1 ± 7.9 MPa for GNP/CF/epoxy composite with 7 wt% GNP loading. The improved tensile strength was due to the carbon fiber and GNP loading in the composite material. The hardness of the composites was also enhanced with GNP loading in the composites. The work was funded in part by ARO (Award # W911NF-15-1-0483).

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