

Abstract Submitted
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Dielectric characterization of multi-walled carbon nanotube nanocomposites as a function of ultraviolet exposure at microwave frequency NATHAN ORLOFF, CHRISTIAN J. LONG, KEVIN TWEDT, THOMAS LAM, JABEZ MCCLELLAND, JAN OBRZUT, J. ALEXANDER LIDDLE, National Institute of Standards and Technology — We investigate multi-walled carbon nanotube epoxy composites as a function of ultraviolet exposure. As the epoxy is etched away from the composite, we found that the multi-walled carbon nanotubes form a thin conducting layer on the surface. We then characterize the multi-walled carbon nanotube composites by atomic force microscopy, lithium ion microscopy, and microwave cavity perturbation at each value of ultraviolet exposure. We perform our measurements on a set of neat samples made from a stoichiometric mixture bisphenol A epoxy resin and another set that contains a mass fraction of 3.5% multi-walled carbon nanotubes. The samples were then exposed to ultraviolet radiation to etch the surface for different durations of time. At the 7.31 GHz, we measured the permittivity and loss tangent of the unexposed epoxy to be $\epsilon' = 2.93 \pm 0.11$ and $\tan\delta = 0.029 \pm 0.002$, respectively. The unexposed epoxy with a mass fraction of 3.5% multi-walled carbon nanotubes had a permittivity of $\epsilon' = 8.01 \pm 0.48$ and loss tangent of $\tan\delta = 0.144 \pm 0.011$.

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