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Time Dependency of Electrical Properties of MWCNT-PVDF Films Subjected to Temperature Cycling

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Abstract

Since their discovery, carbon nanotubes have been utilized to impart electrical conductivity into non-conductive polymers at very low weight percentages. In this study, multi-walled carbon nanotubes (MWCNTs) have been added to a PVDF-based coating for the purpose of static dissipation and structural health monitoring. Due to the uncertain environments that these coatings may see in service, it is imperative to fully understand how the electrical properties of the films will change with environmental conditions over time. In this preliminary study, MWCNT-PVDF films with three different percent loadings of MWCNTs are tested, as well as the effect of the location of the electrodes. The films were subjected to thermal cycles bounded by -70 °C and 80 °C, while maintaining conditions to ensure that the electrical response of the films is due solely to temperature change. The results of this study will show some of the sensitivities due to the electrical properties of the MWCNTs as well as the impact of the PVDF matrix on the electrical properties of the film as a whole.

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