

Abstract Submitted
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Permittivity Measurements of Highly-Insulating Materials

HEATHER ALLEN, JORDAN LEE, JR DENNISON, Utah State University — Permittivity of a dielectric material characterizes how it responds to external, time-varying electric fields and the associated energy loss. This electrical property of the material has important applications with optics, electrical transport, and charge accumulation and dissipation. This experiment focused on permittivity values of polyetheretherketone (PEEK) samples to determine if exposure to high ionizing radiation dose has any effect. Four samples were tested, two unirradiated PEEK samples (one unplated and one with an Au electrode on one side) and two neat PEEK samples previously irradiated with high energy electrons. A standard commercial impedance analyzer and material test fixture were used to take the actual measurements within the range of 10kHz to 10MHz. To gauge the reproducibility and validity of the experimental setup and process, at least two sets of measurements were acquired for each sample, done by different investigators, removing the sample from the testing fixture each time. Comparison of both the real and imaginary permittivity of unirradiated and irradiated samples with variations between the four samples of less than 1 percent determined that there were no statistically significant effects of total ionizing dose from incident electrons.

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