

Abstract Submitted
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High-Frequency Pulsed-Electro-Acoustic (PEA) Measurements for Mapping Charge Distribution¹ KRISTINA SORENSEN, USU Materials Physics Group, LEE PEARSON, Box Elder Innovations, J.R. DENNISON, USU Materials Physics Group, TIMOTHY DOYLE, UVU Physics Department, KENT HARTLEY, USU Materials Physics Group — High-frequency pulsed-electro-acoustic (PEA) measurements are a non-destructive method used to investigate internal charge distributions in dielectric materials. This presentation discusses the theory and signal processing of simple PEA experiments and shows results of PEA measurements. PEA experiments involve a thin dielectric positioned between two conducting electrodes. A voltage signal on the two electrodes generates an electric field across the dielectric, which stimulates embedded charge and creates a pressure wave that propagates within the capacitor. A coupled acoustic sensor then measures the ensuing pressure pulse response. Spatial distributions of the charge profile are obtained from the resultant pressure waveform. Gaussian filters and other signal processing methods are used to increase the signal-to-noise ratio in this waveform. Estimates of the charge distribution inside the dielectric are extracted from this analysis. Our ultimate objective is to develop high resolution PEA methods to investigate in vacuo charge deposition in thin film polymeric, ceramic, or glass dielectric materials using medium to high energy (approximately 103 to 107 eV) electron beams.

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