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## Lifetime Prediction Testing of High Energy Density Metalized Film Capacitors

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### ABSTRACT

High energy density metalized film capacitors can be an enabling technology for pulsed power systems. High electric field stress (i.e. high voltage) is known to limit shot life on these capacitors from breakdowns through the thin film which reduces the capacitance. This is commonly referred to as the “self-healing” property of metalized film caps. Much research has been done to observe this trait of metalized film capacitors and is fairly well understood. However what is not well understood is the fracturing of electrodes which is different than a breakdown through the dielectric but a breakdown between the film metallization and the electrode end treatment. These types of failures are observed in high current discharges which can be even more detrimental than clearings, meaning the lifetime and robustness is inversely proportional to peak current. This fracturing appears to be the dominating failure mode for very high current metalized film capacitors. A test is being developed at Sandia to measure this Electrode Fracture Discharge or EFD using radiated emissions to see how these measurements correlate to lifetime. Lifetime is defined as being the number of shots until 10% loss in capacitance compared to a figure of merit from the lifetime prediction test.

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