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Scaled DC Lifetime, Test and Evaluation of Advanced Nanocomposite Materials for Compact High Voltage Capacitors

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A high dielectric, nanodielectric, composite material, MU100, was originally developed by the University of Missouri for use in dielectric loaded antennas. Based on its material properties, dielectric strength and losses, it was determined that MU100 had possible uses in the development for high energy-density capacitors.

This paper presents the dielectric properties of the materials under development for high energy-density pulsed power applications, relevant to the application of compact high voltage capacitors, as well as recent advances which have been demonstrated during the test and evaluation of these materials. Small scale tests have shown that the average dielectric strength of MU100 to be 225kV/cm with a peak break down field of 328kV/cm. These same small scale capacitors, when potted, have been demonstrated to have lifetimes in excess of 800,000 discharges at 80% of their maximum rated field strength.

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