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Supercapacitors: Ferroelectric Polymer-Ceramic Nanoparticle Composite Films for Use in the Capacitive Storage of Electrical Energy DANA PARSONS, ANDREW PIERCE, TIM PORTER, RANDY DILLINGHAM, DAVID CORNELISON, Physics and Astronomy, Northern Arizona University, Flagstaff, AZ, USA — Most new alternative energy solutions including wind and solar power, will require short term energy storage for widespread implementation. One means of storage would be the use of capacitors owing to their rapid delivery of power and longevity compared to chemical batteries. Capacitor materials exhibiting high dielectric permittivity and breakdown strength, as well as light weight and environmental safety are most desirable. Recently, new classes of capacitor dielectric materials, consisting of ferroelectric polymer matrices containing ceramic nanoparticles have attracted renewed interest due to their high potential energy storage, charge and discharge properties and lightweight. In this study, polyvinylidene flouride (PVDF) thin films containing nanoparticles of the ceramic titanium dioxide created using a physical vapor deposition process, are analyzed for use as dielectrics for a supercapacitor. Measured results of the film parameters including dielectric properties and breakdown voltages will be presented. These parameters will be analyzed with respect to film characteristics such as, dispersion of the ceramic particles, thickness of the films and composition ratios.

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