Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Investigation of PVDF - TiO_2 Nanoparticle Composite Thin Films by XPS, SEM and EDS for Use in the Capacitive Storage of Energy T RANDY DILLINGHAM, TERRY STUFFLEBEAM, Northern Arizona University, TIM PORTER, University of Nevada Las Vegas — In this investigation, thin films of polyvinylidene fluoride (PVDF) containing nanoparticles of the ceramic titanium dioxide (TiO_2) are synthesized using physical vapor deposition techniques. This combination of materials shows promise for possible use as the dielectric in capacitors, particularly regarding energy storage. This composite approach allows for the integration of complimentary features such as high dielectric permittivity from the integrated nanoparticles and high breakdown strength from the polymer matrix, resulting in a greatly enhanced energy density. Co-deposited films with a TiO_2 content up to 8 percent have been synthesized and intermittent contact AFM and elemental mapping from EDS show that the dispersion of the nanoparticles in the material is homogeneous. Analysis from XPS indicates a defluorination of the films (C/F ratio greater than 1) from the deposition process, with the final film being a mixture of PVDF and polyvinyl fluoride (PVD). In addition, other parameters such as the dielectric constant and the breakdown voltage are given.

T Randy Dillingham
Northern Arizona University

Date submitted: 10 Nov 2016 Electronic form version 1.4