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Investigation of PVDF/TiO_2 Composite Films for Use in the Capacitive Storage of Energy JOEL IWAGOSHI, Northern Arizona University — Research on alternative energies has become an area of increased interest due to economic and environmental concerns. Fluctuations due to changing environmental conditions cause instability in the electrical grid. Capacitors made from composite polymer/nanoparticle thin films have been shown to be an economically viable solution. Precise compositional tuning of the two materials in the film can lead to very high energy density storage capacitors. Through thermal vapor deposition, we synthesized dielectric thin films of polyvinylidene fluoride (PVDF) containing the ceramic nanoparticle titanium dioxide (TiO_2). Film composition was analyzed XPS and EDX. Films have been produced with a TiO_2 content up to about 8%. Nanoparticle cluster size was examined using intermittent AFM. Images from this technique confirm uniform TiO_2 dispersion with cluster size less than 150 nm. Our research on the deposition process will contribute to the understanding of PVDF/TiO_2 composite thin films. These results will lead to the investigation of PVDF/TiO_2 high density energy storage capacitors. These capacitors can potentially increase the efficiency of alternative energy sources already in use.

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