Abstract Submitted
for the APR16 Meeting of
The American Physical Society

BaTiO3/PVDF Nanocomposite Film with High Energy Storage Density XIAOHUI WANG, Tsinghua University — A gradated multilayer $BaTiO_3$/poly(vinylidenefluoride) thin film structure is presented to achieve both a higher breakdown strength and a superior energy-storage capability. Key to the process is the sequential deposition of uniform dispersions of the single component source, which generate a blended PVDF-BTO-PVDF structure prior to full evaporation of solvent, and thermal treatment of the dielectric. The result is like sandwich structure with partial 0-3 character. The central layer designed to provide the high electric displacement, is composed of high volume fraction 6-10 nm BTO nanocrystals produced by a TEG-sol method. The outer layers of the structure are predominantly PVDF, with a significantly lower volume fraction of BTO, taking advantage of the higher dielectric strength for pure PVDF at the electrode-nanocomposite interface. The film is mechanically flexible, and can be removed from the substrate, with total thicknesses in the range 1.2 – 1.5μm. Parallel plate capacitance devices improved dielectric performances, compared to reported values for BTO-PVDF 0-3 nanocomposites, with a maximal discharged energy density of 19.4J/cm^3 and dielectric breakdown strengths of up to 495 kV/mm.

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Date submitted: 04 Jan 2016 Electronic form version 1.4