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Ternary PVDF-based terpolymer nanocomposites with enhanced energy density and high power density

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Abstract

The development of advanced dielectric materials with high electric energy densities is of crucial importance in modern electronics and electric power systems. Herein, a kind of ternary poly(vinylidene fluoride)-based ferroelectric terpolymer nanocomposites are prepared using a facile solution cast method. The ternary nanocomposite that is composed of barium strontium titanate (BST) and boron nitride nanosheets (BNNS) can achieve increased dielectric constant and breakdown strength simultaneously. At the optimized filler contents, the ternary nanocomposite discharges an energy density of 24.4 J/cm³, which is 295% that of pristine terpolymer. Moreover, microsecond discharge speed of 2.81 μs along with a power density that is over 13 times that of the current commercial available biaxially oriented polypropylene (BOPP) have been achieved

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