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

Feihua Liu, Qi Li, Zeyu Li, Lijie Dong, Qing Wang, Chuanxi Xiong

PII: S1359-835X(18)30121-0
DOI: https://doi.org/10.1016/j.compositesa.2018.03.019
Reference: JCOMA 4976

To appear in: *Composites: Part A*

Received Date: 12 September 2017
Revised Date: 11 March 2018
Accepted Date: 12 March 2018

Please cite this article as: Liu, F., Li, Q., Li, Z., Dong, L., Wang, Q., Xiong, C., Ternary PVDF-based terpolymer nanocomposites with enhanced energy density and high power density, *Composites: Part A* (2018), doi: https://doi.org/10.1016/j.compositesa.2018.03.019

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

Feihua Liu[1,2], Qi Li[2], Zeyu Li[1], Lijie Dong[1], Qing Wang[2,*], and Chuanxi Xiong[1,*]

[1] School of Materials Science and Engineering and State Key Laboratory of Silicate Materials for Architectures, Wuhan University of Technology, Wuhan 430070, China

[2] Department of Materials Science and Engineering, The Pennsylvania State University, University Park, PA 16802 USA

[*] Corresponding author: Qing Wang (E-mail: wang@matse.psu.edu), Chuanxi Xiong (E-mail: cxiong@whut.edu.cn)

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/cm^3, which is 295% that of pristine terpolymer. Moreover, microsecond discharge speed of 2.81μs along with a power density that is over 13 times that of the current commercial available biaxially oriented polypropylene (BOPP) have been achieved