

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Direct Piezoelectricity of Soft Composite Electrospun Fibers**

MICHAEL VARGA, JASON MORVAN, Liquid Crystal Institute, NICK DIORIO, Chemical Physics Interdisciplinary Program, EBRU BUYUKTANIR, Liquid Crystal Institute; Department of Chemistry, Stark State College, JOHN HARDEN, Liquid Crystal Institute, JOHN WEST, Liquid Crystal Institute; Department of Chemistry, ANTAL JAKLI, Chemical Physics Interdisciplinary Program — Recently soft fiber mats electrospun from solutions of Barium Titanate (BT) ferroelectric ceramics particles and poly lactic acid (PLA) were found to have large ( $d_{33}$  1nm/V) converse piezoelectric signals offering a myriad of applications ranging from active implants to smart textiles. Here we report direct piezoelectric measurements (electric signals due to mechanical stress) of the BT/PLA composite fiber mats at various BT concentrations. A testing apparatus was designed and constructed solely for these measurements involving AC stresses provided by a speaker in 10Hz-10kHz frequency range. The piezoelectric constant  $d_{33} \sim 1\text{nC/N}$  was found to be in agreement with the prior converse piezoelectric measurements. The largest signals were obtained with 6% BT/PLA composites, probably because the BT particles at higher concentrations could not be dispersed homogeneously. Importantly the direct piezoelectric signal is large enough to power a small LCD by simply pressing a 0.2mm thick 2 cm<sup>2</sup> area mat by a finger. We expect to use these mats in active Braille cells and in liquid crystal writing tablets.

Reference: J. Morvan, E. Buyuktanir, J.L. West, A. Jákli, “Highly-piezoelectric Biocompatible and Soft Composite Fiber Mats,” *Appl. Phys. Lett.*, 100, 063901-1-4 (2012)

Michael Varga  
Liquid Crystal Institute

Date submitted: 15 Nov 2012

Electronic form version 1.4