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Length scale effects on percolation of geometrically complex nanocomposites T.J. HOFFMAN, D.R. STEVENS, Department of Physics, N.C. State University, W.A. ROBERTS, Department of Physics, N.C. State Univeristy, R.E. GORGA, Department of Textile Engineering, N.C. State University, L.I. CLARKE, Deparment of Physics, N.C. State University — With growing interest in materials that include nanostructures the focus on nanocomposites (a polymer-based matrix that is enhanced by a nanometer sized particle) has grown. Electrospun nanocomposites contain a complex geometry including fiber sizes of $\approx$ 200 nm arranged in a random mat with a porosity of $\geq$ 70%. Composites utilize connected paths of particles throughout the sample to enhance the mechanical and electrical properties of the matrix. Previous literature has shown, in the case of continuous films, that this percolation phenomenon is affected by the sample size. This work aims to investigate these length scale effects within a complex morphology, such as a nanofiber mat. For a clear understanding of the change in percolation vs. length scale we fabricated interdigitated electrodes (IDEs) with a finger spacing of 10 to 100 μm, electrospun mats onto the IDEs, and performed electrical conductance measurements. In addition, computation simulations of the experimental systems were undertaken. I will discuss our results and the role sample size/shape plays on 1) the percolation threshold and 2) the conductivity vs. doping fraction curve.

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