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Resistive Switching in Ag Nanowire/Polymer Composite Materials JAMIE FORD, ROSE MUTISO, KAREN WINEY, University of Pennsylvania — Bulk composites of electrically conductive nanoparticles within an insulating polymer matrix are insulating when the conductive particle concentration is below the electrical percolation threshold and conductive above it. However, we have observed reversible resistive switching with increasing voltage at room temperature in Ag nanowire/polystyrene composites with nanowire concentrations close to the percolation threshold. We have found the reversibility of the observed switching behavior to be temperature dependent which implies a diffusive process is involved. We propose the basis for resistive switching in these materials is the formation of field-induced filaments between adjacent nanowires that extend the percolated electrical network and increase the overall conductivity of the system. Here, we will compare our observations of resistive switching in Ag nanowire/polystyrene and Ag nanowire/poly(methylmethacrylate) bulk nanocomposites, explore the breadth of metal nanowire and polymer systems that exhibit resistive switching, and explore the underlying mechanism for filament formation.

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