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Resistive Switching Behavior in Silver Nanowire-Polystyrene Composites SADIE WHITE, PATRICK VORA, JAMES KIKKAWA, JOHN FISCHER, KAREN WINEY, University of Pennsylvania — Thin-film resistive switching devices have been extensively studied for use as memory elements, while the resistive switching behaviors of bulk composites have not been widely investigated to date. We report resistive switching in bulk, isotropic silver nanowire-polystyrene composites. Composites with nanowire concentrations close to and greater than the percolation threshold show resistive switching behaviors consistent with the formation of reversible, field-induced metal filaments between silver nanowires. In contrast, at nanowire concentrations significantly below the electrical percolation threshold, the composites exhibit no switching. Comparable experiments performed on single-walled carbon nanotube-polystyrene composites, both above and below the electrical percolation threshold, produced no resistive switching. The fields at which switching occurs in our silver nanowire composites are significantly lower than those previously reported for thin-film, polymer-based resistive switching elements, and on/off cycling experiments indicate that the switching process is stable over approximately 20,000 cycles.

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