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Magnetic and Transport Properties of Carbon Nanotube-Based One-Dimensional Nanocomposite Materials ADAM FRIEDMAN, LATIKA MENON, JESSE SILVERBERG, Northeastern University Department of Physics, YUNG JOON JUNG, Northeastern University Department of Mechanical Engineering — Carbon nanotubes (CNTs) prove to be extremely well suited for the investigation of electron conduction in one-dimensional materials. CNTs have been shown to conduct in the ballistic regime according to Landauer's formula. When placed in electromagnetic fields and at low temperatures where the mean free path is smaller than the diameter of the tube, CNTs been shown to be the perfect platform to study Luttinger liquid behavior, the Kondo effect and quantum fluctuations, electron coherence, and the Aharonov-Bohm effect. These unique properties can be further enhanced by inserting materials into the cavities of the CNTs. In this work, we use anodized porous alumina templates as a substrate for the controlled growth of CNTs by means of chemical vapor depostion. AC electrodeposition is then used to deposit Fe, Ni, Co, as well as semiconductor nanowires inside the tubes. The magnetic and electrical properties of such nanotube-nanowire composites (both single and bundled) in the presence of applied magnetic fields upto 5.5T and at low temperatures down to 4.2K are studied and preliminary results will be reported.

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