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Ambient Formation of Aligned Carbon Nanotube Networks MARCUS LAY, PORNNIPA VICHCHULADA, University of Georgia — Nano-scale electronic materials will play a roll of great significance in electronic devices of the near future. Carbon nanotubes (CNTs), in particular, show great technological promise. Yet, major obstacles to the incorporation of CNTs into practical electronic devices remain; one such challenge is the lack of a method to form ordered constructs of individual carbon nanotubes on a large scale. 2-dimensional networks of CNTs show potential as a method of circumventing the difficulties associates with lack of control over the physical and electrical properties of individual CNTs; for a random distribution of CNTs, the density of the network is the major factor controlling device properties, as fluctuations in characteristics of individual CNTs become less important. Therefore, a 2-D network composed of a mixture of metallic and semiconducting CNTs behaves as a semiconductor above the percolation threshold for semiconducting nanotubes. A novel method of creating ordered arrays of purified CNTs has been developed to attain a higher level of control over reproducibility in CNT-based applications. This method uses unidirectional airflow to order CNTs in aqueous suspension and deposit them on a prepared surface. The result is an electrically continuous array of highly aligned CNTs. These ordered arrays of CNTs exhibit electrical conductivity over macroscopic lengths (up to $3''$), and have shown promise in field-effect transistor (FET) applications.

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