Controlled Fabrication of Carbon Nanotubes and their Architectures

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Carbon nanotubes have been investigated actively due to their excellent mechanical, electrical and thermal properties as well as nanometer scale one-dimensional structures. However, to build highly organized and integrated systems with carbon nanotubes, it is required to arrange them into well-defined configurations in a large scale. In this presentation, first we will introduce our strategy for directing the assembly of carbon nanotubes in a variety of predetermined orientations onto patterned substrates, building them into one-, two- and three-dimensional nano/micro scale architectures using a chemical vapor deposition and nano/micro fabrication methods. Also, we will present the novel technique, transferring aligned MWNT architectures and networks into a flexible poly (dimethylsiloxane) (PDMS) matrix to build nanotube-polymer multifunctional composite systems. Our recent characterizations on these structures and properties have demonstrated immediate and immense implications for the development of versatile, low-cost and portable electronic and electro-mechanical devices for diverse applications such as flexible field emission devices, interconnect, and flexible strain and gas sensors.