



## Carbon Nanotube Networks for Flexible Electronics

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**Abstract:** The exceptional electronic, thermal, mechanical and optical characteristics of carbon nanotubes (CNTs) offer significant performance improvement in a variety of applications. However, precise alignment and control of CNTs are bottlenecks for many applications. Thin films or composites using a large number of nanotubes in random networks, mats or parallel arrays offer a potential solution, as these structures are relatively inexpensive and are compatible with large scale manufacturing. CNT network based thin films have motivated extensive study for their possible use in diverse applications of electronic devices, avionic structures, energy conversion devices, thermal interface materials, interconnects, sensors, solar cells and hydrogen storage devices. Carbon nanotube networks based thin-film transistors (CN-TFTs) have been considered as strong candidates to improve mobility, flexibility, transparency in applications such as active matrix display drivers, antennas and sensors. In this talk, an overview of CN-TFTs and its different applications will be presented. How the behavior of nanotube networks in its nano-electronic devices, regardless of the visual complexity, can be understood as a consequence of the mathematical properties of the tube percolation network will be discussed. Finally, power dissipation and network breakdown in CN-TFTs and their percolating networks will be presented.

**Biography:** Dr. Satish Kumar is currently Associate Professor in George W. Woodruff School of Mechanical Engineering at Georgia Tech. He joined Georgia Tech in 2009 as an Assistant Professor. Prior to Georgia Tech, he worked at IBM Corporation where he was responsible for the thermal management of electronic devices. Kumar received his Ph.D. in Mechanical Engineering and M.S. degree in Electrical and Computer Engineering from Purdue University, West Lafayette in 2007; and B.Tech. degree in Mechanical Engineering from the Indian Institute of Technology, Guwahati in 2001. His research interests are in thermal management, atomistic transport models for nano-structures, flexible-electronics and thermo-electric coolers. He is author or co-author of over 90 journal or conference publications. Dr. Kumar is recipient of Purdue Research Foundation Fellowship in 2005, 1969 Teaching Fellow from Center for the Enhancement of Teaching and Learning Center at Georgia Tech, 2012 Summer Faculty Fellow from Air Force Research Lab, 2014 Sigma Xi Young Faculty Award, and 2014 DARPA Young Faculty Award. His research has been supported by grants from National Science Foundation (NSF), Office of Naval Research (ONR), Defense Advanced Research Projects Agency (DARPA), Oak Ridge National Lab (ORNL), and Semiconductor Research Corporation (SRC).