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Modeling Nanotube Networks For Semiconductor Channels and Sensors MEG NOAH, YOUNG-KYUN KWON, Nanomanufacturing Center of Excellence and Center for High-rate Nanomanufacturing, University of Massachusetts, Lowell — We present a model to characterize ensembles of NT networks using properties of individual from measurement and from ab initio computations, and including changes in the presence of gases like NH_3, pressure, or external fields. From these, we simulate networks for user-specified channel shape, size and inhomogeneous NT mixtures. For example, the ensemble IVg characteristics of 2 by 2 micron network can readily be compared to ensembles of 20 by 40 micron networks or annular networks with 1 micron and 3 micron radii for a mixure of nanotubes characterized by independent length distributions for each chirality and then compared subjected to different environmental conditions. Validation with experimental data resulting from inhomogeneous NT mixtures is presented. Our goal is to optimize nanomanufacturing parameters like channel size for a user-defined application be it gas sensor, pressure actuator, or semiconductor answering questions like: "What is the statistical conductivity enhancement in the presence of NO_2?" "What radii yield the most semiconducting for 1 micron SWNT?" and "How does conductivity change as a function of gas density?" We focus on the fundamental understanding of nanocomposites.

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