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Synthesis and Mechanical and Electrical Properties of Carbon Nanotubes Grown at Low Temperatures by Thermal Chemical Vapor Deposition YUNYU WANG, LI SHI, Department of Mechanical Engineering, University of Texas at Austin, ZHEN YAO, Department of Physics, University of Texas at Austin, PAUL HO, Department of Mechanical Engineering, University of Texas at Austin — Carbon nanotubes (CNTs) have shown great potentials in versatile applications such as electron sources, heat interface materials and drug delivery vehicles due to their unique aspect ratio, thermal conductivity, and biocompatibility. CNTs have also attracted wide interests in applications for the next generation microelectronics, including interconnects, mainly due to its high current carrying capacity, *i.e.* $>10^9$ A/cm^2. However, CNTs have been commonly synthesized under high temperatures, e.g. > 1000 ^{o}C for laser ablation and arc discharge and 600-900 ^{o}C for chemical vapor deposition (CVD), which is not compatible with the < 450 ^{o}C requirement for microelectronic technology, and makes it difficult to integrate CNTs into integrated circuit chips. In this study, we present a controlled growth of CNTs at 450 ^{o}C using a simple thermal CVD method. It has been shown that a combination of catalyst choice and preheating precursors is critical for the formation of CNTs at low temperatures. As-grown CNTs have been characterized using scanning electron microscopy, where vertically aligned dense short nanotubes films with lengths of ~ 400 nm have been observed. For applications in microelectronics, mechanical and electrical properties of short CNT films are tested and the results will be discussed. .

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