Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Semiconducting nanotube dominant chemical vapor deposition synthesis of isopropanol carbon feedstock YUCHI CHE, CHUAN WANG, JIA LIU, XUE LIN, University of Southern California, H.-S. PHILIP WONG, Stanford University, CHONGWU ZHOU, University of Southern California — The development of guided chemical vapor deposition (CVD) growth of single wall carbon nanotubes provides great platform for wafer-scale integration of aligned nanotube into circuits and systems. However, the co-existence of the metallic and semiconducting nanotubes is still a major problem for the development of carbon nanotube based nanoelectronics. To address this limitation, we developed a method to get semiconducting dominant nanotube by using isopropanol carbon feedstock. We achieved a purity of 87% of semiconducting nanotube growth, which was verified by measuring single nanotube transistors fabricated from aligned nanotube arrays. Besides, Raman spectrum was characterized to confirm the enhanced fraction of semiconducting nanotube as well. To further understand chemical mechanism of synthesis at atomic level, we performed the mass spectrum study and compared the measurement results from different carbon source. Furthermore, to discuss the future application of this synthesis method, we fabricated thin-film transistor from as-grown nanotube network. Transistor with on/off ratio over 104 and mobility up to 116 cm2/v•s was achieved, which shows great potential for thin-film transistor applications.

Yuchi Che
University of Southern California

Date submitted: 23 Nov 2011 Electronic form version 1.4