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Electronic and optoelectronic devices based on chirality-enriched wafer-scale single-wall carbon nanotube thin films WEILU GAO, XIAOWEI HE, LIJUAN XIE, QI ZHANG, ECE Department, Rice University, ERIK HAROZ, STEPHEN K. DOORN, Los Alamos National Laboratory, JUNICHIRO KONO, ECE Department, Rice University — The unique and rich material properties of single-wall carbon nanotubes (SWCNTs) make them attractive for nano-electronic and optoelectronic applications. Slight changes in tube diameter and wrapping angle, defined by the chirality indices (n,m), can dramatically modify the bandstructure, which can be utilized for designing devices with tailored properties. However, it remains to be a challenge to fabricate macroscopic, single-chirality devices. Here, we introduce a simple way of producing chirality-enriched wafer-scale SWCNT films by combining recently developed solution-based polymer-modified sorting method[1] and vacuum filtration. The produced thin films can be easily transferred onto any substrate to have a CMOS compatible wafer. We fabricated a transistor of (6,5)-enriched SWCNTs with an on/off ratio $>10^3$. Large-scale photothermoelectric-effect-based and photovoltaic-effect-based photodetectors made of (6,6)- and (6,5)-enriched films, respectively, will also be discussed.

[1]C. Y. Khripin *et al.*, JACS **18**, 6822 (2013)

Weilu Gao
ECE Department, Rice University

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