**Super Tough Carbon Nanotube Composite Fibers**

Alan B. Dalton, Steve E. Collins, Edgar Muñoz, Joselito M. Razal, Von Howard Ebron, John P. Ferraris, Jonathan N. Coleman, Bog G. Kim, and Ray H. Baughman

Department of Chemistry and The NanoTech Institute
The University of Texas at Dallas
Richardson, Texas 75080, USA

The energy needed to break spider silk, called toughness, is over a hundred times higher than to break the same weight steel wire. Individual carbon single walled nanotubes (SWNTs) have a much higher Young's modulus, strength, and toughness than spider silk but have yet to be fabricated into continuous fibers displaying comparable properties to spider silk. We will describe our results on spinning hundred-meter-long carbon nanotube composite fibers having a tensile strength about equal to spider silk and a toughness far exceeding that of spider silk, prior-art carbon fibers, or synthetic fibers like Spectra and Kevlar. We have also constructed fiber supercapacitors displaying capacitances of 5 F/gm, based on all components, and energy densities of ~ 1 Wh/kg (1V) from these spun fibers and have woven them into textiles.