

## Novel Dispersion and Self-Assembly of Single Wall Carbon Nanotubes

Mohammad F. Islam  
Department of Chemical Engineering and  
Department of Materials Science & Engineering  
Carnegie Mellon University  
Pittsburgh, PA  
mohammad@andrew.cmu.edu

I will describe our explorations of carbon nanotube science and technology from a soft materials perspective. We first created stable dispersions of purified single wall carbon nanotubes (SWNTs) using an anionic surfactant, sodium dodecyl benzene sulfonate (NaDDBS), and then studied their structure and rheology in suspension, demonstrating interconnected networks of stiff filaments. Our attempts to induce nematic liquid crystalline alignment of SWNTs in suspension did not succeed, but eventually led us to create a new class of nanocomposite: nematic nanotube gels. These gels exhibit rich physical properties due to a coupling between the nematic alignment and the polymer network elasticity. Finally, I will describe the fabrication of ultra-light-weight, electrically conducting and thermally insulating three-dimensional carbon nanotube aerogels and their use as transparent electrodes in organic photovoltaic cells.

This work has been supported by the NSF through the DMR-0645596, DMR-0619424 and CBET-0933510, Alfred P. Sloan Foundation and the donors of the American Chemical Society Petroleum Research Fund.