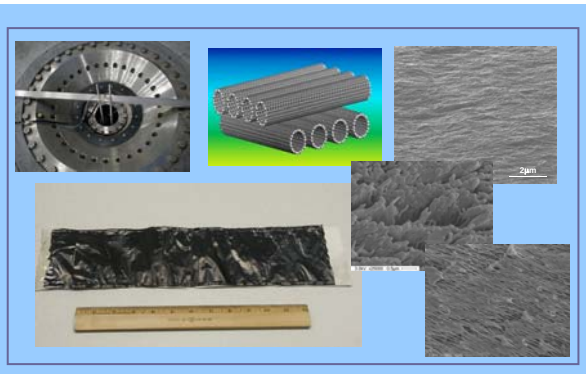
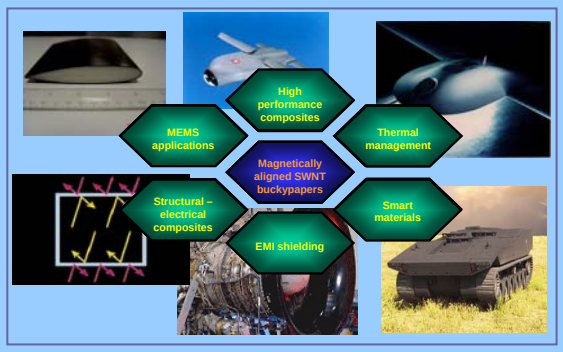
Synopsis:
Magnetically Aligning SWNTs for High-Performance, Multifunctional Nanomaterials with Buckypaper Films



World's largest magnetically aligned buckypaper sheet



Potential applications of nanocomposites

Background

SWNTs possess remarkable mechanical and functional properties. Theoretical and experimental results show that SWNTs may have a tensile strength close to 200 GPa or 40 times greater than IM7 carbon fiber, which is currently used is aircraft structures. The most exceptional mechanical, electrical, and thermal conducting properties of SWNTs are along their axial direction due to their highly anisotropic nature. Effectively and affordably aligning nanotubes is vital for the production of high performance structural nanocomposites and multifunctional nanomaterials. Using buckypaper nanotube film, HPMI has developed methods to magnetically align SWNTs in high-strength magnetic fields to fabricate nanomaterials and devices to orient the nanotubes to produce optimal results.

Goals

- Develop processing techniques to affordably fabricate nanomaterials and devices with desired tube orientation and high tube loading using magnetically aligned buckypaper nanotube sheets
- Reveal effects of SWNT orientation on mechanical and functional properties

Projects/Research Highlights

- Developed the world's largest magnetically aligned buckypaper nanotube sheets
- Explore the interactions of SWNTs with magnet force and optimize tube alignment process
- Develop affordable techniques for magnetically aligning SWNTs in buckypaper sheets by using an innovative continuous process and superconducting magnets
- Fabricate and characterize nanomaterials and devices with desirable in-plane tube orientation

Benefits to Industry

- Develop affordable techniques to take advantage of SWNTs' remarkable properties through alignment and high tube loading
- Develop high-performance structural nanomaterials and multifunctional devices using SWNT buckypaper sheets