

# Anyuan Cao

## Contact information:

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## Education:

**08/01/2005 ~ pres. Assistant Professor**

Department of Mechanical Engineering, University of Hawaii at Manoa.

**2002 ~ 07/31/2005 Post-doctoral researcher**

Department of Materials Science & Engineering, Rensselaer Polytechnic Institute.

**1996 ~ 2002**

**PhD Degree of Engineering**

**School:** Mechanical Engineering, Tsinghua University, P. R. of China.

**Award:** National annual 100 Outstanding PhD Thesis of China

(2004)

## Research interests:

1. Rational synthesis of one-dimensional nanoscale structures (e.g. carbon nanotubes, nanowires, and their heterojunctions) with controlled diameter, orientation, and distribution; Growth of vertically aligned carbon nanotube films; Large-scale production of multi-walled and single-walled nanotubes through continuous chemical vapor deposition.
2. Assembly of nanomaterials into meso-scale organized three-dimensional architectures; Directed growth of nanotubes along predefined path for electrical and thermal interconnects.
3. Characterization of mechanical, thermal, electrical, and optical properties of aligned carbon nanotubes.
4. Applications of carbon nanomaterials in areas including electromechanical and optoelectronic devices, mechanical reinforcement and damping, thermal management, chemical adsorption and filtering, environmental and biological applications.

## Selected peer-reviewed publications:

1. Cao A, Vinod V, Li X, Yao Z, Nejjad M, Ajayan PM. "Multifunctional brushes made from carbon nanotubes" *Nature Mater.* 4, 540-545 (2005).
2. Cao A, Talapatra S, Vajtai R, Ajayan PM. "Flow-induced planar assembly of parallel carbon nanotubes and crossed nanotube junctions" *J. Nanosci. Nanotech.* 5 (7), 1177-1180 (2005).

3. Cao A, Talapatra S, Choi Y, Vajtai R, Ajayan PM, Filin A, Persans P, Rubio A. "Recovered band-gap absorption of single-walled carbon nanotubes in acetone and alcohols" *Adv. Mater.* 17 (2): 147-150 (2005).
4. Cao A, Ajayan PM, Filin A, Persans P. "Tailoring the optical excitation energies of single-walled carbon nanotubes" *Appl. Phys. Lett.* 85, 1598-1600 (2004).
5. Cao A, Meng G, Ajayan PM. "Nanobelt-templated growth of carbon nanotube rows" *Adv. Mater.* 16 (1): 40-44 (2004).
6. Cao A, Ajayan PM. "Zigzag assembly of carbon nanotubes inside micro Au trenches" *J. Phys. Chem. B* 108 (20): 6160-6163 (2004).
7. Cao A, Ajayan PM, Ramanath G, Baskaran R, Turner K. "Silicon oxide thickness-dependent growth of carbon nanotubes" *Appl. Phys. Lett.* 84 (1), 109-111 (2004).
8. Cao A, Baskaran R, Frederick MJ, Turner K, Ajayan PM, Ramanath G. "Direction-selective and length-tunable in-plane growth of carbon nanotubes" *Adv. Mater.* 15 (13): 1105-1109 (2003).
9. Cao A, Ajayan PM, Ramanath G. "Assembly of mm-scale macrobridges with carbon nanotube bundles" *Appl. Phys. Lett.* 83 (2): 356-358 (2003).
10. Cao A, Wei B, Jung Y, Vajtai R, Ajayan PM, Ramanath G. "Growth of aligned carbon nanotubes on self-similar macroscopic templates" *Appl. Phys. Lett.* 81 (7): 1297-1299 (2002).

#### Conference presentations:

11. Cao A, Ajayan PM. "Multi-functional carbon nanotube based brushes" *Materials Research Society (MRS) meeting*, 2005 Spring, San Francisco (presented on Mar 31, 3:00 – 3:15 pm).
12. Cao A. "Tailored assembly of carbon nanotubes by chemical vapor deposition" *31st Federation of Analytical Chemistry and Spectroscopy Societies (FACSS) Annual meeting*, 2004, Portland, OR (presented on Oct. 7<sup>th</sup>, 12:10 – 12:30 pm).
13. Cao A, Baskaran R, Turner K, Ramanath G, Ajayan PM. "Silicon oxide thickness-dependent growth of carbon nanotubes" *Materials Research Society (MRS) meeting*, 2003 Fall, Boston (presented on Dec 1<sup>st</sup>, 11:30 am)
14. Cao A, Filin A, Persans P, Ajayan PM. "Tailoring the optical excitation energies of single-walled carbon nanotubes" *Materials Research Society (MRS) meeting*, 2003 Fall, Boston (presented on Dec 5<sup>th</sup>, 10:45 am).

#### Research highlights

- 1) Work of "Multi-functional brushes made from carbon nanotubes" published in *Nature Materials* (June, 2005) was reported by more than 50 news media throughout the world as "**the world's smallest brush**", including BBC news (UK), Science in Action (BBC World Service Broadcast on June 18), Science News (USA), Chemical & Engineering News (USA), National Geographic News (USA), NewScientist.com (USA), Popular Science (USA), Micro/Nano Letters (USA), Sensors (USA), DER SPIEGEL (Germany), Frankfurter Allgemeine Zeitung (Germany), ZeitWissen Magazin (Germany), Spektrum der Wissenschaft (German edition of "Scientific American"), De Standaard (Belgie), El Mundo (Spain), CNR (Spain), Kyodo News (Japan), Jiji Press (Japan), De Ingenieur (The Netherlands), and so on.
- 2) Work of "Self-templating nanotube growth" was highlighted by *nanotechweb.org* in the news of August 20<sup>th</sup>, 2002, in the title of "**Carbon nanotube networks fall into line**".

- 3) Work of “Hierarchically branched nanotubes” was highlighted by [nanotechweb.org](http://nanotechweb.org) in the news of May 5<sup>th</sup>, 2005, with the title of “**Nanostructures branch out with templates**”.
- 4) **Patent:** “Directed Assembly of highly-organized Carbon Nanotube Architectures (047182-0106)” (pending)
- 5) **Membership:** Materials Research Society (MRS), American Society of Mechanical Engineers (ASME).

**Invited referee for journals:**

*Advanced Materials, Nano Letters, Langmuir, J. of Physical Chemistry, J. of Nanoscience and Nanotechnology, Carbon, Surface Coatings & Technology, Department of Energy (research proposal), Chemosphere, J. of Electronic Materials, MRS Symposium Proceedings.*

**Courses offered:**

ME696 Fracture Mechanics (Fall 2005)