

ERIK T. THOSTENSON

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EXECUTIVE SUMMARY

Dr. Thostenson is an Assistant Professor in the Department of Mechanical Engineering at the University of Delaware. Professor Thostenson's research currently focuses on processing and characterization of composite materials based on carbon nanotube and advanced fiber reinforcements toward the development of novel multifunctional composites and micro/nano mechanics modeling techniques. During the course of the research he has developed novel processing and characterization techniques for the development of structure/property relationships and *in situ* sensors in nanotube-reinforced polymer and ceramic composites. His research has been cited more than 1,700 times in the scientific literature (ISI Database).

Thostenson recently received a Young Investigator Proposal Award from the Air Force Office of Scientific Research and has been Co-PI on several major research programs, including a National Science Foundation Nanoscale Interdisciplinary Research Team (NSF-NIRT) program, two programs funded by the Office of Naval Research and an Air Force Office of Scientific Research Program. He has also been also PI or Co-PI of small business technology transfer research (STTR) programs funded by the Office of Naval Research and the Air Force Office of Scientific Research and PI on a research program funded by the DuPont Company. On these research programs he is conducting independent and collaborative research in the area of advanced composite materials.

He is the recipient of the Elsevier Young Composites Researcher Award from the American Society for Composites which is awarded to a researcher early in his/her career has made a significant impact on the science and technology of composite materials through a sustained research effort. Thostenson is also the recipient of the inaugural Hayashi International Memorial Award (2004) from the Japan Society for Composite Materials, recognizing outstanding young international researchers in the field of composites. He received the Allan P. Colburn Prize for outstanding dissertation in the engineering and mathematical sciences (University of Delaware Office of Graduate Studies), the Roy L. McCullough Scholars Award (Center for Composite Materials) for exceptional contributions to the literature on composite materials, and the Society for the Advancement of Material and Process Engineering (SAMPE) Outstanding Graduate Student Award.

Thostenson, who holds a Ph.D. in Materials Science and a master's degree in Mechanical Engineering from the University of Delaware, is an affiliated faculty member at the University of Delaware's Center for Composite Materials. In addition to his scholarly research in advanced materials at the graduate and post-graduate level, Dr. Thostenson has a Bachelor's degree in Composite Materials Engineering (Summa Cum Laude) from Winona State University.

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EDUCATION

- Doctor of Philosophy** in Materials Science (2004)
University of Delaware, Newark, Delaware
Dissertation: Carbon Nanotube-Reinforced Composites: Processing, Characterization and Modeling
- Master of Science** in Mechanical Engineering (1999)
University of Delaware, Newark, Delaware
Thesis: Microwave-Accelerated Curing of Thick Composite Laminates: Experiment and Simulation
- Bachelor of Engineering** in Composite Materials Engineering (1995)
Winona State University, Winona, Minnesota
Summa Cum Laude

PROFESSIONAL EXPERIENCE

- Assistant Professor** (2009 - Present)
Department of Mechanical Engineering – University of Delaware
- Research Assistant Professor** (2006 - 2009)
Department of Mechanical Engineering – University of Delaware
- Associate Scientist** (2005 - 2006)
Department of Mechanical Engineering – University of Delaware
- Postdoctoral Research Fellow** (2004 - 2005)
Department of Mechanical Engineering and Center for Composite Materials – University of Delaware
- Research Assistant** (1995 - 2003)
Department of Mechanical Engineering, Department of Materials Science & Engineering and Center for Composite Materials – University of Delaware
- Graduate Lecturer** (Fall 2000)
Department of Materials Science and Engineering – University of Delaware
- Laboratory Assistant**, Fermi National Accelerator Laboratory (Summer 1995, 1993)
- Teaching Assistant**, Department of Composite Materials Engineering (1994-95)
– Winona State University

HONORS AND AWARDS

- **Young Investigator Award**, Air Force Office of Scientific Research – 2009-2011
- **Elsevier Young Composites Researcher Award**, American Society for Composites – 2007
- **Hayashi International Memorial Award**, Japan Society for Composite Materials – 2004

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- **Allan P. Colburn Prize for Outstanding Dissertation in the Mathematical and Engineering Sciences**, University of Delaware – 2004
- **Roy L. McCullough Scholar's Award**, Center for Composite Materials – 2004
- **Outstanding Graduate Student Award**, Society for the Advancement of Material and Process Engineering (SAMPE) – 1st place, Ph.D. Student Symposium – 2002
- University of Delaware Competitive Fellowship – 2000-2001
- **Directors' Award**, Center for Composite Materials – 1999
- **Hoechst Celanese Excellence in Engineering Award** – 1998
- **C. E. Birchenall Award**, Brandywine Valley Chapter of ASM International – 1997
- ARO/URI Fellowship – 1995-1998
- U.S. Olympic Committee Sport Science and Technology Design Contest – Finalist 1995
- Society of Plastics Engineers Scholarship – 1994
- Non-resident Tuition Scholarship, Winona State University – 1991-1995
- Winona State University Dean's List – 1992-1995 (11 of 12 quarters)
- National Honors Society, National Dean's List

PROFESSIONAL ACTIVITIES AND SERVICE

- Reviewer for international scientific journals including, *Advanced Materials*, *Advanced Functional Materials*, *Advances in Polymer Technology*, *Carbon*, *Composites Science and Technology*, *Composites Part A*, *Composites Part B*, *eXPRESS Polymer Letters*, *Journal of Intelligent Material Systems and Structures*, *Journal of Nanoscience and Nanotechnology*, *Macromolecular Materials and Engineering*, *Micro and Nano Letters*, *Modelling and Simulation in Materials Science*, *Nanotechnology*, *Polymer*, *Smart Materials and Structures*.
- Organizing Committee, 24th American Society for Composites Technical Conference – 2009
- Chair, Mechanical Engineering Publicity Committee – 2009-present
- Member, CCM Safety Committee (laboratory area leader) – 1998-present
- Member, Mechanical Engineering Safety Committee – 2009-present
- Organized CCM laboratory tours and gave introductory presentations on composite materials for students attending the Delaware Aerospace Academy summer camp – 1999-2007
- Vice-President, SAMPE – University of Delaware student chapter – 2000-2003
- Vice-President, SAMPE – Winona State University student chapter – 1994-1995
- Treasurer, Society of Plastics Engineers (SPE) – Winona State University student chapter – 1993-1994

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DISSERTATION / THESIS

- E. T. Thostenson, ***Carbon Nanotube-Reinforced Composites: Processing, Characterization and Modeling***, Ph.D. Dissertation, Department of Materials Science and Engineering, University of Delaware, (2004).
- E. T. Thostenson, ***Microwave-Accelerated Curing of Thick Composite Laminates: Experiment and Simulation***, Master's thesis, Department of Mechanical Engineering, University of Delaware, (1998).

BOOK CHAPTERS

- C. Y. Li, E. T. Thostenson and T-W. Chou, "Carbon Nanotube-Based Composites and Damage Sensing," ***Multifunctional Polymer Nanocomposites***, CRC Press, (to be published in 2010).
- D. Heider, R. C. Don, E. T. Thostenson, K Tackitt, J. H. Belk and T. Munns, "Cure Monitoring and Control," ***ASM Handbook Volume 21 Composites***, ASM International, Materials Park, OH (2001).

PUBLICATIONS – REFEREED LITERATURE

1,749 Total Citations – ISI Database, September 25, 2009

- T-W Chou, L. M. Gao; E. T Thostenson; Z. G. Zhang and J-H. Byun, "An Assessment of the Science and Technology of Carbon Nanotubes and their Composites," submitted for publication, (2009).
- L. M. Gao, E. T. Thostenson Z. G. Zhang J-H. Buyn and T-W. Chou, "Damage Monitoring in Fiber-Reinforced Composites under Fatigue Loading Using Carbon Nanotube Networks," ***Philosophical Magazine***, in press (2009).
- E. T. Thostenson, J. J. Gangloff, C. Y. Li and J-H. Buyn, "Electrical Anisotropy in Multiscale Nanotube/Fiber Hybrid Composites," ***Applied Physics Letters***, 95(7): 073111 (2009).
- E. T. Thostenson S. Ziaee and T-W. Chou, "Processing and Electrical Properties of Carbon Nanotube / Vinyl Ester Nanocomposites," ***Composites Science and Technology***, 69(6): 801-804 (2009).
- L. M. Gao, E. T. Thostenson Z. G. Zhang and T-W. Chou, "Coupled Carbon Nanotube Network and Acoustic Emission Monitoring for Sensing of Damage Development in Composites," ***Carbon***, 47(5): 1381-1388 (2009).
- K. Okubo, T. Fuji and E. T. Thostenson, "Multi-Scale Hybrid Biocomposite: Processing and Mechanical Characterization of Bamboo Fiber Reinforced PLA with Microfibrillated Cellulose," ***Composites - Part A***, 40(4): 469-475 (2009).
- L. M. Gao, E. T. Thostenson, Z. G. Zhang and T-W. Chou, "Sensing of Damage Mechanisms in Fiber-Reinforced Composites under Cyclic Loading using Carbon Nanotubes," ***Advanced Functional Materials***, 19(1): 123-130 (2009).

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- E. T. Thostenson and T-W. Chou, "Carbon Nanotube-Based Health Monitoring of Mechanically Fastened Composite Joints," ***Composites Science and Technology***, 68(12) 2557–2561 (2008).
- E. T. Thostenson and T-W. Chou, "Real-Time in situ Sensing of Damage Evolution in Advanced Fiber Composites using Carbon Nanotube Networks," ***Nanotechnology***, 19(21) 215713 (2008).
- C. Y. Li, E. T. Thostenson and T-W. Chou, "Sensors and Actuators Based on Carbon Nanotubes and their Composites: A Review," ***Composites Science and Technology***, 68(6) 1227-1249 (2008).
- C. Y. Li, E. T. Thostenson and T-W. Chou, "Effect of Nanotube Waviness on the Electrical Conductivity of Carbon Nanotube-Based Composites," ***Composites Science and Technology***, 68(6) 1445-1452 (2008).
- E. Bekyarova, E.T. Thostenson, A. Yu, M.E. Itkis, D. Fakhrutdinov, T-W. Chou and R.C. Haddon, "Functionalized Single-Walled Carbon Nanotubes for Carbon Fiber-Epoxy Composites," ***Journal of Physical Chemistry C***, 111(48) 17865 - 17871 (2007).
- C. Li, E.T. Thostenson and T-W. Chou, "Dominant role of tunneling resistance in the electrical conductivity of carbon nanotube-based composites," ***Applied Physics Letters***, 91(22), 223114 (2007).
- E. Bekyarova, E.T. Thostenson, A. Yu, H. Kim, J. Gao, J. Tang, H.T. Hahn, T-W. Chou, M.E. Itkis and R.C. Haddon, "Multiscale Carbon Ntube – Carbon Fiber Reinforcement for Advanced Epoxy Composites," ***Langmuir***, 23(7), 3970-3974 (2007).
- E. T. Thostenson and T-W. Chou, "Carbon Nanotube Networks: Sensing of Distributed Strain and Damage for Life Prediction and Self-Healing" ***Advanced Materials***, 18(22) 2837-2841 (2006).
- E. T. Thostenson and T-W. Chou, "Processing-Structure-Multifunctional Property Relationship in Carbon Nanotube/Epoxy Composites," ***Carbon***, 44(14) 2869-3148 (2006).
- E. T. Thostenson, P. G. Karandikar and T-W. Chou, "Fabrication and Characterization of Reaction Bonded Silicon Carbide / Carbon Nanotube Composites," ***Journal of Physics D: Applied Physics***, 38(21) 3962-3965 (2005).
- E. T. Thostenson, C. Y. Li and T-W. Chou, "Nanocomposites in Context," ***Composites Science and Technology***, 65(3-4) 491-516 (2005).
- E. T. Thostenson and T-W. Chou, "Nanotube Buckling in Aligned Multi-Wall Carbon Nanotube-Reinforced Composites," ***Carbon***, 45 3015-3018 (2004).
- E. T. Thostenson and T-W. Chou, "On the Elastic Properties of Carbon Nanotube-Based Composites: Modeling and Characterization," ***Journal of Physics D: Applied Physics***, 36(5) 573-582 (2003).

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- E. T. Thostenson and T-W. Chou, "Aligned Multi-Walled Carbon Nanotube-Reinforced Composites: Processing and Mechanical Characterization," ***Journal of Physics D: Applied Physics***, 35(16) L77-L80 (2002).
- E. T. Thostenson, W. Z. Li, D. Z. Wang, Z. F. Ren and T-W. Chou, "Carbon Nanotube/Carbon Fiber Hybrid Multiscale Composites," ***Journal of Applied Physics***, 91(9) 6034-6037 (2002).
- E. T. Thostenson, Z. F. Ren and T-W. Chou, "Advances in the Science and Technology of Carbon Nanotubes and their Composites: A Review," ***Composites Science and Technology***, 61(13) 1899-1912 (2001).
- E. T. Thostenson and T-W. Chou, "Microwave and Conventional Curing of Thick-Section Thermoset Composite Laminates: Experiment and Simulation," ***Polymer Composites***, 22(2), 197-212 (2001).
- E. T. Thostenson and T-W. Chou, "Microwave Processing: Fundamentals and Applications," ***Composites Part A***, 30(9), 1055-1071, (1999).
- J. Li, E. T. Thostenson, T-W. Chou and L. Riester, "An Investigation of Thin-Film Coating/Substrate Systems by Nanoindentation," ***Journal of Engineering Materials and Technology***, 120(2), 154-162, (1998).
- R. W. Rydin, E. T. Thostenson and H-Y. Ma, "An Assessment of the Impact Response of Knit-Knit and Knit-Stitch Composites," ***Science and Engineering of Composite Materials***, 7(3), 269-277 (1998).

CONFERENCE PUBLICATIONS

- E. T. Thostenson, "Starting From Nano: Creating Multifunctional Composites From (Almost) Nothing," ***Proceedings of the American Society for Composites 24th Annual Technical Conference***, Newark, DE, September 15-17 (2009).
- E. T. Thostenson and T. W. Chou, "Vinyl Ester Nanocomposites for Damage Sensing in Naval Applications," ***Proceedings of the 17th International Conference on Composite Materials***, Edinburgh, Scotland, July 27-31 (2009).
- L. M. Gao, E. T. Thostenson, Z. G. Zhang and T-W. Chou "Multifunctional Carbon Nanotube Network Sensors for Damage Sensing and Health Monitoring of Fiber-Reinforced Composites," ***Proceedings of the SAMPE '09, The 54th International SAMPE Symposium and Exhibition***, Baltimore, MD, May 18-21 (2009).
- A. Gawandi, E. T. Thostenson and J. W. Gillespie Jr., "Experimental Investigation of Tow Pullout Behavior of Aramid Fabric," ***Proceedings of the 9th International Conference on Textile Composites (TEXCOMP-9)***, Newark, DE, October 13-15 (2008).
- E. T. Thostenson L. M. Gao and T-W. Chou, "Carbon Nanotube Networks: *In situ* Sensing of Damage Evolution in Fiber Composites," ***Proceedings of the 40th International SAMPE Technical Conference***, Memphis, TN, September 8-11 (2008).

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- E. T. Thostenson and T-W. Chou, "Scalable Processing Techniques for Nanotube-Based Polymer Composites," ***Proceedings of the 16th International Conference on Composite Materials (ICCM-16)***, Kyoto, Japan, July 8-13 (2007).
- E. T. Thostenson, V. Gendlin and T-W. Chou, "Carbon Nanotube Composites for Self-Sensing of Deformation and Damage," ***Proceedings of the 52nd International SAMPE Symposium and Exhibition***, Baltimore, Maryland, June 3-7, (2007).
- E. T. Thostenson and T-W. Chou, "Multifunctional Composites with Self-Sensing Capabilities: Carbon Nanotube-Based Networks," ***SPIE Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring (SS/NDE) 2007***, Proceedings of SPIE Volume: 6526, San Diego, CA March 18-22 (2007).
- E. T. Thostenson and T-W. Chou, "Multifunctional Carbon Nanotube/Epoxy Composites: Processing and Characterization," ***Proceedings of the 38th International SAMPE Technical Conference***, Dallas, TX November 6-9 (2006).
- E. T. Thostenson and T-W. Chou, "Multi-Scale Hybrid Fabric / Nanotube Composites: Processing and Characterization," ***Proceedings of the 8th International Conference on Textile Composites (TEXCOMP-8)***, Nottingham UK, October 16-18 (2006).
- E. T. Thostenson and T-W. Chou, "Influence of Reinforcement Morphology on Nanocomposite Fracture Behavior," ***Proceedings of the 16th European Conference of Fracture (ECF16)***, Alexandroupolis, Greece, July 3-7 (2006).
- E. T. Thostenson and T-W. Chou, "Nanotube-Reinforced Composites: Characterization and Modeling," ***Proceedings of the American Society for Composites 19th Annual Technical Conference***, Atlanta, GA, (2004).
- E. T. Thostenson and T-W. Chou, "Recent Advances in Processing, Characterization and Modeling of Carbon Nanotube-Reinforced Composites," ***Proceedings of the 11th US-Japan Conference on Composite Materials***, Yamagata, Japan, (2004).
- E. T. Thostenson, C. Y. Li and T-W. Chou, "Nanoscale Devices and Nanocomposites Based on Carbon Nanotubes: Processing, Characterization and Modeling," ***Proceedings of the 11th International Conference on Composites/Nano Engineering (ICCE-11)***, Hilton-Head, SC, (2004).
- E. T. Thostenson and T-W. Chou, "Nanoscale Design of Carbon Nanotube – Reinforced Composites: Bridging the Micro and Nano Scales," ***Proceedings of the 14th International Conference on Composite Materials (ICCM-14)*** San Diego, CA (2003).
- E. T. Thostenson and T-W. Chou, "Structure/Mechanical Property Relationships in Carbon Nanotube-Based Composites: Characterization and Modeling," ***Proceedings of the Sixth International Seminar on Experimental Techniques and Design in Composite Materials***, Vicenza, Italy (2003).
- E. T. Thostenson and T-W. Chou, "Structure/Property Modeling in Carbon Nanotube-Reinforced Composites," ***Proceedings of the 10th International Conference on Composites/Nano Engineering (ICCE-10)***, New Orleans, LA (2004).

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- E. T. Thostenson and T-W. Chou, "Processing, Structure and Properties of Carbon Nanotube-Based Polymer Composites," ***Proceedings of the 17th annual meeting of the American Society for Composites***, October 21-23, West Lafayette, IN (2002).
- E.T. Thostenson, C. Li and T-W. Chou, "Carbon Nanotube-Reinforced Composites: Processing, Modeling and Property Characterization," ***Proceedings of the 10th US-Japan Conference on Composite Materials***, September 16-18, Stanford University (2002).
- E. T. Thostenson, C. Li and T-W. Chou, "Recent research in carbon nanotube composites," ***Proceedings of the 9th International Conference on Composites Engineering (ICCE-9)***, (Keynote Address) July 1-6, San Diego, CA (2002).
- E. T. Thostenson, C. Li and T-W. Chou, "Carbon Nanotube Reinforcement: Characterization and Modeling of Composites at the Nanoscale," ***Proceedings of the 10th European Conference on Composite Materials (ECCM-10)***, (Keynote Address) June 3-7, Brugge, Belgium (2002).
- E. T. Thostenson, Z. F. Ren and T-W. Chou, "Recent Advancements in Carbon Nanotubes and their Composites" ***Proceedings of the 13th International Conference on Composite Materials (ICCM-13)*** (Keynote Address) June 25-29, Beijing, China. (2001).
- E. T. Thostenson, Z. F. Ren and T-W. Chou, "Interfacial Characterization of Carbon Nanotube-Modified Graphite Fiber Composites," ***Proceedings of the 16th Annual Technical Conference of the American Society for Composites*** September 10-12, Blacksburg, VA (2001).
- E. T. Thostenson, C. Li, Z. F. Ren, and T-W. Chou, "Carbon Nanotube-Based Polymeric Composites," ***Proceedings of the 8th International Conference on Composites Engineering (ICCE-8)***, Tenerife, Spain (2001).
- B. Chen, E. T. Thostenson, and T-W. Chou, "Some Fundamental Issues in Liquid Composite Molding Processes," ***Proceedings of the Sixth Japan International SAMPE Symposium***, Eds. T. Tanimoto and T. Morii, Japan Chapter of SAMPE, p. 35-39, (1999).
- E. T. Thostenson and T-W. Chou, "Application of Microwave Heating for Adhesive Joining," ***Advances in Aerospace Materials and Structures***, AD-Vol. 58, ASME, p. 89-95, (1999).
- E. T. Thostenson and T-W. Chou, "Microwave-Accelerated Curing of Thick Composite Laminates," ***Proceedings of the 13th annual meeting of the American Society for Composites (ASC)***, September 21-23, Baltimore, MD, on CD-ROM (1998).
- E. T. Thostenson and T-W. Chou, "Microwave Processing of Thick-Section Composite Materials," ***Proceedings of the 12th annual meeting of the American Society for Composites (ASC)***, October 6-11, Dearborn, MI, p. 931-940 (1997).