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[Overview](#)

[Research and Creative Activity](#)

Dr. Colton came to the George W. Woodruff School of Mechanical Engineering at Georgia Tech in 1985, after completing his SB, SM, and PhD in Mechanical Engineering at MIT. He serves as Director of the Institute-wide Center for Polymer Processing. He also holds a courtesy appointment in the School of Industrial Design of the College of Architecture. He teaches graduate and undergraduate courses in design and manufacturing. He is principal researcher on projects sponsored by - among others - National Science Foundation, National Institute of Standards and Technology, National Institutes of Health, U.S. Department of Education, NATO, Ford, General Motors, General Electric, Schlumberger, U.S. Navy, and Lockheed-Martin Corp. He has spent a year as a Visiting Professor at Imperial College, London. Dr. Colton serves on the Immunization Practices Advisory Committee of the World Health Organization (WHO).

Dr. Colton is a Fellow of the American Society of Mechanical Engineers and of the Society of Plastics Engineers, has been a Woodruff Faculty Fellow, and has received the NSF Presidential Young Investigator Award, the SAE Teetor Award, and the SME Outstanding Young Manufacturing Engineer Award. Dr. Colton received a NASA Space Act Award. He has received the outstanding paper award from the Rapid Prototyping Journal. In 2007, he was named the Jack M. Zeigler Outstanding Educator Award, George W. Woodruff School of Mechanical Engineering

at the Georgia Institute of Technology. He is a registered professional engineer in the State of Georgia.

Education

PhD, Massachusetts Institute of Technology, 1986

SM, Massachusetts Institute of Technology, 1982

SB, Massachusetts Institute of Technology, 1981

Fields

- Humanitarian Design and Engineering (HumDE)
- Manufacturing, Production, and Design: Polymer and polymer composites
- Biomedical and Medical Devices: Technologies for developing countries and other resource-limited environments.

Distinctions

- World Health Organization, Technology and Logistics Advisory Committee, 2008-2011
- The Global Soap Project, board of directors, 2011-present
- Amigos for Christ, Community Service Award, 2011
- Woodruff School Jack M. Zeigler Outstanding Educator Award, 2007
- National Aeronautical and Space Administration, Space Act Award, 2005
- Sigma Xi (Georgia Tech Chapter)
- Best Ph.D. Thesis Award (Advisor to Andrew McFarland), 2005
- Best M.S. Thesis Award (Advisor to Anne Palmer), 2000
- Society of Plastics Engineers
- Board of Directors (Medical Physics Division), 2006-2010
- Fellow, 2004
- Board of Directors (Composites Division), 2001-2009
- Emerald Literai Club Award, Highly Commended Paper, 2002 volume of Rapid Prototyping Journal, 2003
- MCB University Press Award, Most Outstanding Paper, 1999 volume of Rapid Prototyping Journal, 2000
- American Society of Mechanical Engineers Fellow, 1999
- Woodruff School Faculty Fellow, 1992-1997
- Society of Automotive Engineers Ralph R. Teetor Educational Award, 1992
- National Science Foundation Presidential Young Investigator Award, 1989-1994
- Society of Manufacturing Engineers Outstanding Young Manufacturing Engineer, 1988
- American Society for Engineering Education New Engineering Educator, 1986
- National Bureau of Standards Certificate of Recognition for Sustained Superior Performance, 1979
- Registered Professional Engineer in Georgia

Dr. Colton's research interests are in the areas of design and manufacturing, focusing on polymers and polymer composites. Processing techniques, such as micro-molding, injection molding, filament winding, resin transfer molding and the like, are studied and used to fabricate these devices and products, such as smart composite structures. The design of processing techniques and equipment for metamaterials also are being studied with applications being dielectric materials for electromagnetic applications. Due to the small-scale physics associated

with their engineering, nano-scale materials exhibit superior properties and enhanced performance. Dr. Colton has a strong passion for the application of engineering for the common good – "humanitarian design and engineering" and "design that matters," - such as in developing countries and other resource limited environments. To be successful, multidisciplinary teams must work together to produce products that function as well as delight, that exceed customer's expectations, regardless of where the product is used. Along these lines, product design and role that the interactions between engineering and Industrial Design forms another research interest.

Patents

- Microcellular Foams of Semi Crystalline Polymeric Materials, U. S. Patent 5,160,674, with N. P. Suh, Nov. 3, 1992
- Flexible Multiply Towpreg, Products Therefrom, and Methods of Production Therefor, European Patent EP0589925, Canadian Patent CA2103037, Japanese Patent JP6510954T, and Taiwanese Patent 63364, with J. D. Muzzy and B. Varughese, November 26, 1992
- Non-woven Flexible Multiply Towpreg Fabric, U.S. Patent 5,198,281, with J. D. Muzzy, March 30, 1993
- Flexible Multiply Towpreg Tape from Powder Fusion Coated Towpreg and Method for Production Thereof, U. S. Patent 5,296,064, with J. D. Muzzy, March 22, 1994
Flexible Multiply Towpreg Tape from Powder Fusion Coated Towpreg, U. S. Patent 5,409,757, with J. D. Muzzy, April 25, 1995
- Collapsible Footstool, U. S. Patent 6,036,269, March 14, 2000

Recent Journal Articles

- "A Process for Prestaging Thermosetting Towpreg," *Polymer Composites*, **20:1**, 132-145 (1999) (with R.W. Beck)
- "Experimental Study of Post-build Cure of Stereolithography Polymers for Injection Molds," *Rapid Prototyping Journal*, **5:2**, 72-81 (1999) (with B.M. Blair)
- "Serviceability Considerations for the Layout of Coiled Tubing Units," *Journal of Engineering Design*, **10:3**, 259-275 (1999) (with V. Rotundo)
- "A Process Management Strategy for Re-design: An Anchoring and Adjustment Approach," *Journal of Engineering Design*, **11:3**, 159-173 (2000) (with L.A. Dixon)
- "Evaluation of Epoxy Resins for Use in Hot, Wet Environments," *Polymer Plastics Technology and Engineering*, **39:4**, 667-682 (2000) (with K. Becker)
- "A Machine System for the Rapid Production of Composite Structures," *Polymer Composites*, **20:1**, 124-133 (2000) (with J.H. Brown)
- "Thermal Effects on Stereolithography Injection Mold Inserts," *Polymer Engineering and Science*, **40:6**, 1360-1368 (2000) (with Y. LeBaut)
- "Failure Mechanisms in Stereolithography Injection Molding Tooling," *Polymer Engineering and Science*, **40:6**, 1395-1404 (2000), (with A.E. Palmer)
- "Material Systems for Rapid Manufacture of Composite Structures," *Polymer Composites*, **21:6**, 918-930 (2000) (with J. Kinard)
- "Draft Angle and Surface Roughness Effects on Stereolithography Molds," *Polymer Engineering and Science*, **40:7**, 1581-1588 (2000) (with T. Cedorge)
- "Design Rules for Stereolithography Injection Molding Inserts," *CIRP - Journal of Manufacturing Systems*, **30:2**, 175-182 (2000) (with T. Cedorge, Y. LeBaut, and A. Palmer)
- "Open-celled Thermoplastic Microcellular Foam," *Polymer Engineering and Science*, **41:3**, 380-400 (2001), (with B. Rodeheaver)
- "Failure of Rapid Prototype Molds during Injection Molding," *CIRP Annals*, **50:1**, 129-132 (2001) (with J. Crawford, G. Pham, and V. Rodet)
- "Ejection Force Modeling for Stereolithography Injection Molding Tooling," *Polymer Engineering and Science*, **42:4**, 681-693 (2002) (with G. Pham)

- "Effects of Aging on Epoxy-based Rapid Tooling Materials," *Rapid Prototyping Journal*, **8:4**, 215-223 (2002) (with X. Ottemer)
- "Using Genetic Algorithms to Set Target Values for Engineering Characteristics in the House of Quality," *Journal of Computing and Information Science in Engineering - Transactions of the ASME*, **2:2**, 106-114 (2002), (with M.P. Brackin)
- "Properties of Rapid Prototype Injection Mold Tooling Materials," *Polymer Engineering and Science*, **43:1**, 125-138 (2003) (with V. Rodet)
- "Flexible Polymer Composite Electromagnetic Crystals," *Polymer Engineering and Science*, **43:4**, 822-830 (2003) (with C. Marrett, A. Moulart, and A. Tcharkhtchi)
- "Sheet Metal Forming using Polymer Composite Rapid Prototype Tooling," *Journal of Engineering Materials and Technology - Transactions of the ASME*, **125:3**, 247-255 (2003), (with Y. Park)
- "Assessment of Percolation and Homogeneity in ABS/Carbon Black Composites by Electrical Measurements," *Composites Part B: Engineering*, **34:7**, 607-614 (2003) (with R. Ou and R.A. Gerhardt, C. Marrett, and A. Moulart)
- "Polymeric Composites for Use in Electronic and Microwave Devices," *Polymer Engineering and Science*, **44:3**, 588-597 (2004) (with A. Moulart and C. Marrett)
- "Production and Analysis of Injection Molded Micro-Optics Components," *Polymer Engineering and Science*, **44:3**, 564-579 (2004) (with A. McFarland)
- "Measuring the Compression of a Carbon Nanospring," *Nano Letters*, **4:6**, 1009-1016 (2004) (with M.A. Poggi, J.S. Boyles, L.A. Bottomley, A.W. McFarland, C.V. Nguyen, R.M. Stevens, and P.T. Lillehei)
- "Production and Characterization of Polymer Microcantilevers," *Review of Scientific Instruments*, **75:8**, 2756-2758 (2004), also *Virtual Journal of Nanoscale Science and Technology*, **10:9**, August 30 (2004) <http://www.vjnano.org/nano/> (with A.W. McFarland, M.A.Poggi, and L.A. Bottomley)
- "Injection Moulding of High Aspect Ratio Micron-scale Thickness Polymer Microcantilevers," *Nanotechnology*, **15:11**, 1628-1632 (2004) (with A.W. McFarland, M.A. Poggi, and L.A. Bottomley)
- "A Method for Calculating the Spring Constant of Atomic Force Microscope Cantilevers with a Nonrectangular Cross-section," *Analytical Chemistry*, **77:4**, 1192-1195, (2005) (with M.A. Poggi, A.W. McFarland, and L.A. Bottomley)
- "Fabrication and analysis of plastic hypodermic needles," *Journal of Medical Engineering and Technology*, **29:4**, 181-186 (2005) (with H. Kim)
- "Characterization of Microcantilevers Solely by Frequency Response Acquisition," *Journal of Micromechanics and Microengineering*, **15:4**, 785-791 (2005) (with A.W. McFarland, M.A. Poggi, and L.A. Bottomley)
- "Failure Analysis of Rapid Prototyped Tooling in Sheet Metal Forming-V-Die Bending," *Journal of Manufacturing Science and Engineering - Transactions of the ASME*, **127:1**, 116-125 (2005) (with Y. Park)
- "Failure Analysis of Rapid Prototyped Tooling in Sheet Metal Forming-Cylindrical Cup Drawing," *Journal of Manufacturing Science and Engineering - Transactions of the ASME*, **127:1**, 126-137 (2005) (with Y. Park)
- "Role of Material Microstructure in Plate Stiffness with Relevance to Microcantilever Sensors," *Journal of Micromechanics and Microengineering*, **15:5**, 1060-1067 (2005) (with A.W. McFarland)
- "Chemical Sensing with Micromolded Plastic Microcantilevers," *Journal of Microelectromechanical Systems*, **14:6**, 1375-1385 (2005) (with A.W. McFarland)
- "Injection-moulded Scanning Force Microscopy Probes," *Nanotechnology*, **16:8**, 1249-1252 (2005) (with A.W. McFarland, M.A. Poggi, and L.A. Bottomley)
- "Influence of Surface Stress on the Resonant Behavior of Microcantilevers," *Applied Physics Letters*, **87**, 053505 (2005) (with A.W. McFarland, M.A. Poggi, M.J. Doyle,

and L.A. Bottomley)

- "Fatigue of Rapid Prototyped, Sheet Metal Forming Dies," *International Journal of Fatigue*, **28:1**, 43-52 (2006) (with Y. Park)
- "Microcantilevers: Sensing Chemical Interactions via Mechanical Motion," *Chemical Reviews*, **108:2**, 522-542 (2008) (with K.M. Goeders, and L.A. Bottomley)
- "Production of Anisotropic Dielectric Materials in Foams," *Journal of Cellular Plastics*, **45**, 461-478 (2009) (with C. Blandin)
- "Characterization of Plastic Hypodermic Needles," *Journal of Medical Devices-Transactions of the ASME*, **3**, 041004 (2009) (with E. Busillo)
- "Oven Melting Encapsulization of Hypodermic Needles by Syringes," *Journal of Medical Engineering and Technology*, **33:8**, 616-621 (2009) (with T. Fortner, H. Wynn, and H. Heffner)

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