

NTC Research Briefs Introduction

The National Textile Center (NTC) is a research consortium of eight universities: [Auburn University \(Consumer Affairs, Engineering\)](#), [University of California at Davis](#), [Clemson University](#), [Cornell University](#), [Georgia Institute of Technology](#), [University of Massachusetts at Dartmouth](#), [North Carolina State University](#) and [Philadelphia University](#).

To view the full Research Brief of the work described in the highlight below, click on the project number. For further research details, see the project's website reported in this Research Brief, in the 2004 Annual Report, on the web at http://www.ntcresearch.org/current/FY2004/FY2004_proj.htm or on the latest CD. You can keyword search and view all NTC Reports ever published at <http://ntcresearch.org> and also view all reports on the CD.

To contact any principal investigator, see their bio following each Research Brief for their email address, phone, website address and NTC project numbers. Bios for all principal investigators who ever participated in an NTC project are continuously updated on the web at http://ntcresearch.org/PDF_BIO_index.htm and/or on the latest CD/ROM.

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NTC Research Briefs by Competency Groups

Materials

Research in the design, development and measurement of natural and synthetic polymeric materials and fibers, including polymer mixtures and additives.

Transport in Fibrous Substrates: Liquid and Solid Interactions

From microscopic liquid and solid interactions, we are developing stochastic models to predict liquid transport behavior in fibrous substrates. (Pan with Cornell) [M02-CD03]

Functional Fibers for Immobilization of Biomolecules

We are developing processes to chemically activate the surface of fibrous materials for the recovery of biomolecules, such as specialty enzymes, by encapsulation/immobilization. (Hsieh with Natick) [M02-CD05]

Biomimetic Manufacturing of Fibers: Materials Development

Using spider silk and collagen as a model, we are investigating the role that protein primary structural components play in protein expression and in fiber production and properties. (Ellison) [M02-CL04]

Photonic Crystal-Based Polymer Optical Fibers

Photonic crystal-based fibers could give a new look to fibers, not only for fashion, but for added functionalities. (Brown) [M02-CL06]

Nano Engineered Fire Resistant Composite Fibers

We are developing a fundamental understanding of the thermal insulation of heat and fire resistant polymeric composite fibers when embedded with nanoparticle fillers. (Patra with Auburn) [M02-MD08]

Polymers Processed with Cyclodextrin Inclusion Compounds

We have developed a fundamental understanding of how cyclodextrin inclusion compounds deliver properties (e.g. flame retardancy, antibacterial, color) to polymers during processing. (Tonelli with Ga Tech) [M02-NS01]

Biologically Active Bioabsorbable Fibers for Biomedical Uses

We are developing poly(ester-amide)-based, biologically active bioabsorbable fibers with improved biodegradation and biological properties for biomedical applications. (Chu with UTenn) [M03-CR04]

Nano Crafted Layered Optical Filaments for Diffractive Colors

By understanding the structures needed to print interference colors on textiles, we can enable new sensors and fabrics that can reflect or transmit light for optimal cooling or warming. (Calvert with Clemson) [M03-MD14]

Liquid Wetting and Flow in Nano-Fibrous Systems

We are developing computer models to predict and characterize wettability, permeability, flow, transport phenomena and absorbency in nanoporous fibers and nanofibrous substrates. (Hsieh with TRI) [M04-CD01]

Distributed Sensors and Actuators via Electronic-Textiles

Using electrospinning, we are developing non-woven "e-textiles" containing charged carbon nanotubes to provide enhanced sensing capabilities for more reliable and accurate feedback. (Jalili) [M04-CL05]

Poly(lactic acid) Derived Fibers with Enhanced Performance

We are researching ways to significantly enhance the thermal and mechanical performance of biodegradable fibers from renewable resources (e.g. lactide from corn sugar). (Smith with TRI) [M04-CL07]

Surface Modification of Capillary Surface Material Fibers

We are tailoring the surfaces of capillary surface material fibers using linear, hyperbranched and comb-polymer migratory additives for biomedical applications. (Hirt with Florida) [M04-CL11]

Cellular Encapsulation into Porous Alginate Fibers

We are developing fibrous biomaterials with genetically modified cells that release biological agents that emulate normal wound healing of body tissue. (Brown with Rhode Island) [M04-CL13]

Nano Scale Polymerization and Fiber Spinning

Using "extrusion polymerization" through mesoporous silica channels, we are producing highly crystalline nylon and polyester nanofibers with exceptional mechanical properties. (Jacob with Ohio St) [M04-GT11]

Terahertz Properties of Textiles: Metamaterials, Sensors and Security

We are developing textiles that strongly interact with terahertz radiation for range of applications in security, defense, and industry, with a focus on chemical and environmental sensors. (Citrin) [M04-GT19s]

Textile Fibers Engineered from Molecular Auxetic Polymers

We are developing polymeric fibers that exhibit a strong bulk auxetic response under tensile stress because of fundamental lateral expansions on a molecular level. (Griffin) [M04-GT21]

Quantum Tunneling Nanocomposites as Sensors and Actuators in Fabric

We are using piezoresistivity arising from quantum tunneling in conducting polymer nanocomposites to make printable stress sensors and actuators for textiles. (Patra) [M04-MD07]

Fabrication

Research in the fabrication, processing and manufacture of fibrous structures and fabricated products.

Compressive Behavior of Fiber Assemblies

We are characterizing compressive behavior of fiber assemblies with a combination of modeling and experimental techniques. (Jacob) [F02-GT04]

Layered Fiber-based Microtubes

We are exploring the technological potential of submicron diameter tubing of electroactive polymeric materials for applications in sensing and actuation. (Ghosh) [F02-NS05]

Virtual 3D Draping of Apparel

We are developing methods for an accurate, virtual 3-D draping of apparel on a digitized 3-D model of the human body considering variations in fabric mechanical properties. (May-Plumlee) [F02-NS08]

Textile Prostheses for Vascular Applications

We are exploring the application of textile structures as stents. (Adanur with UMassD, Emory U.) [F03-AE02]

Electro-Static Web Formation

We are using electrostatic field forces to form webs with positively controlled fiber orientation and minimal hook formation for improved strength, pore size and bending behavior. (Kim with NC State) [F03-MD01]

Bio-active Bandages

We are developing bandages that contain growth factors that will be able to accelerate wound healing. (Bhowmick with Harvard) [F03-MD15]

Coated and Laminated Fabrics for Fuel Cells

We are modeling proton exchange membranes to find new ways to improve their performance in fuel cells. (Adanur with UMassD) [F04-AE01]

Fibrous Micro-Electro-Mechanical-Systems (MEMS)

We are developing a fundamental understanding of fiber elasticity, strength and near fatigue-free behavior at sub-millimeter scales of common MEMS structures such as cantilevers. (Netravali) [F04-CR02]

Frequency Effect on Drawing Behavior of Staple Fiber Strands

We are developing the knowledge base to enhance the strand drafting process by minimizing drafting waves in staple yarn manufacturing. (Wang with UC Davis) [F04-GT01]

Superdraw Processing of Hollow Fibers

We seek to understand the fundamental principles of superdrawing, and to study its application to hollow fiber production. (Wang with East Carolina) [F04-GT02]

Micro-Flow in Textiles

Magnetic Resonance Imaging and Computational Fluid Dynamics provide a detailed insight into flow phenomena in textiles. (Leisen with Niederrhein Univ.) [F04-GT05]

Compact Fiber-Based Biofiltration Systems

We are developing highly efficient, fiber-based bioconversion media for use in the detoxification of ammonia contaminated water. (Kim) [F04-MD11]

Fracture Toughness of Through-Thickness Reinforced Composites

We are developing fabric layered organic polymer engineering composite materials with improved interlaminar shear strength. (Rice with MIT, US Army) [F04-MD12]

Printing Electric Circuits onto Non-Woven Conformal Fabric Substrates

We are developing technology to print flexible electronic circuit boards onto nonwoven surfaces which are custom designed to allow controlled diffusion of conductive inks. (Pourdeyhimi) [F04-NS17]

Single-Step Protein Surface-Attachment to Electrospun Fibers

By electrospinning conventional synthetic polymers with novel synthetic-bioorganic hybrid copolymers, we aim to produce fibers with specific bioactive surface functionalities. (Spontak with Max Plank) [F04-NS26]

Chemistry

Research in chemical applications to, and modifications of, fibers and fiber substrates, including dyeing, finishing and waste reduction.

Biomimicking of Enzymes for Textile Processing

We are investigating the possibility of biomimicking the catalytic function of the active site of oxidoreductase enzymes by simpler compounds without the greater part of the protein. (Buschle-Diller) [C02-AE02]

Pressure Washing of Textiles to Save Water and Effluent

We are studying the feasibility of using continuous, pulsed and aerated pressure washing of fabrics as a way to significantly reduce rinse water and effluent. (Gowayed)[C02-AE08]

Textiles that Protect Wearers from Biological and Chemical Hazards

We are developing radical grafting polymerization as a way to provide disinfecting and detoxifying agents to textile surfaces, particularly for self-decontaminating protective clothing. (Sun with Auburn) [C02-CD06]

Textile Ink Jet: Drop Formation and Surface Interaction

We are studying the fundamental mechanisms of drop formation and drop/surface interaction in the regimes characteristic of textile ink jet printing. (Carr) [C02-GT07]

Biomimetic Decolorization of Mill Effluent

We are building nanofactories from grafted porphyrin-based catalysts and singlet oxygen chemistries to destroy organic material, such as dyes, in textile/carpet mill effluent. (Michielson with Emory,NC St)[C02-GT09]

One-Step Fabric Formation and Coloration

We are using cyclodextrins that function simultaneously as warp sizes and latent colorants to combine the weaving and the ink jet printing steps. (George with NC State) [C02-PH03]

Universal Set of Dyes for Digital Inkjet Textile Printing

Using new technology to rapidly design new molecules, we are creating a universal set of dyes and chemicals that enable inkjet printing on chemically diverse textile materials. (Ujiie) [C03-PH01]

Nano-Porous Ultra-High Specific Surface Fibers

Via electrospinning, we have produced ultra-high specific surface nanofibers by creating roughened surfaces and nano-porous structures. (Hsieh with UMassD, Natick) [C04-CD06s]

Ultrahydrophobic Fibers: Lotus Approach

By biomimicking the hydrophobicity and miniature protrusions on lotus leaves, we are developing ultrahydrophobic fibers with excellent water repellency and self-cleaning ability. (Luzinov with Clarkson) [C04-CL06]

Ionic Crosslinking - A Novel Method of Fabric Stabilization

To replace formaldehyde-based crosslinking agents, we are developing ionic ones that provide outstanding wrinkle recovery and strength retention, but do not release carcinogens. (Smith) [C04-NS01]

Static Generation and Control in Textile Systems

We are seeking fundamental understanding of static generation/control on polymer surfaces in terms of processing parameters, ambient conditions, polymer type and finish. (Seyam with Western Ontario) [C04-NS07]

Optimizing Color Control Throughout the Textile Supply Chain

We are developing an integrated color control system that optimizes color models and methods to enable effective digital color communication throughout the textile supply chain. (Hinks) [C04-NS11]

Genetic Algorithms in Molecular Design of Novel Fibers

We are developing an extensive structure-property database to aid in designing fibers with improved properties, such as stretch, strength, bulk, comfort and dyeability. (Sztandera with Cornell, Oxford)[C04-PH02s]

Systems

Research in the management of product design, sourcing, production, distribution and consumption systems.

Modeling Consumer Behavior in On-line Environments

We are developing a model to predict on-line adoption of consumer search and purchase behaviors for textile and apparel products. (Forsythe) [S02-AC23]

Strategic Model for Functional Protective Clothing

We developed a way to provide durable biocidal properties to Nomex[®] protective uniforms that are refreshable by commercial laundering without loss in thermal or mechanical properties. (Sun) [S02-CD01]

Optimizing the Textile Complex Value Chain

By measuring buyer and seller perceptions of value of competing purchase options from country to country, we are developing value chain models for the textiles complex. (Rucker w. CalStPolytechPomona)[S02-CD02]

Sensory Science: Interactions in Textile Evaluations

We are developing a fundamental understanding of the social, cultural and physical factors that interact to shape human sensory responses to textiles. (Kaiser with U of Delaware) [S02-CD04]

Knowledge Management Across the Value Chain for Competitive Advantage

We seek to understand how passive and proactive knowledge management systems across the textile and apparel value chain can impact competitive advantage. (Solomon with Berry College) [S03-AC01]

Sustainable Environmental Practices for Competitive Advantage

We are developing a model to determine which sustainable practices (resource usage, waste reduction) can most reduce costs and increase quality and sales, particularly in the carpet industry. (Rusinko) [S03-PH01]

Improving Competitiveness of the U.S. Textile and Apparel Complex

We developed a model that seeks to optimize labor/capital ratios and energy resources and measures the impact of trade agreements and foreign competition. (Datta with NC State) [S03-PH02]

Apparel Product Development for Plus-Sized Tween Girls

With body scan, social-psychological and behavioral data, we seek to improve garments and sizing for overweight and obese girls aged 9-14 to improve their social interactions. (Connell/Ulrich with [TC]²) [S04-AC01]

Effects of Carpets on Posture Steadiness and Locomotion Stability

We are investigating how biomechanical and ergonomic factors affect postural steadiness, locomotion stability and human fatigue on textile floor coverings. (Pan with Georgia Tech) [S04-CD03]

Improved Apparel Sizing: Fit and Anthropometric 3-D Scan Data

By using body scan data to gain insight into body/apparel relationships, we are developing protocols to improve fit of existing sizing systems. (Ashdown with Fashion Inst of Technology) [S04-CR01]

Quantifying the Value of Information in a Supply Chain

We are developing ways to quantify the value of information sharing in a supply chain (e.g. inventory levels, demand forecasts) to improve intelligent decisions regarding operation of that chain. (King) [S04-NS02]

Guide to NTC Project Numbers (XNN-YYnns) where ...

X = first letter of the competency
NN = last two numbers of the NTC fiscal year (May to April) when the project was first funded
YY = university:
AC = Auburn Consumer Affairs (was A)
AE = Auburn Textile Engineering (was A)
CL = Clemson (was C)
CD = U Cal-Davis (was E)
CR = Cornell (was B)
GT = Georgia Tech (was G)
MD = U Mass Dartmouth (was D)
PH = Philadelphia U. (was P)
NS = North Carolina State (was S)
nn = number assigned by university to project
s (if present) = seed project

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NTC Directory

Principal Investigators, Operating Board, Site Directors, Staff:

- **Bios, Photos, E-mail, etc.** . see http://ntcresearch.org/PDF_BIO_index.htm

Biographies for everyone who has ever been an NTC principal investigator include title, institution, academic degrees, experience, research interests, E-mail address, telephone number, personal web site address and all NTC projects they worked on (FY1999-2005 projects renumbered per below). Work just commenced on the “05” projects on May 1, 2005, so they are not reported here.

NTC Research Briefs by Project Management

Auburn University (Consumer Affairs) Management

Modeling Consumer Behavior in On-line Environments

(Forsythe)..... S02-AC23 (I02-A23)

Knowledge Management as Competitive Advantage in the Textile and Apparel Value Chain

(Solomon with Berry College)..... S03-AC01

Apparel Product Development for the Plus-Sized Tween and Teen Market

(Connell with [TC]²) S04-AC01

Masculine Style(s): Shifting Identities and Textile/Apparel

(Solomon with UC Davis, Univ. Delaware, Cornell) S05-AC02

Auburn University (Engineering) Management

Biomimicking of Enzymes for Textile Processing

(Buschle-Diller) C02-AE02 (C02-A02)

Assessment of Continuous, Pulsed and Aerated Pressure Washing

(Gowayed) C02-AE08 (C02-A08)

Textile Prostheses for Vascular Applications

(Adanur with UMassD, Emory)... F03-AE02

Coated and Laminated Fabrics for Fuel Cells

(Adanur with UMassD) F04-AE01

Investigation of Organic Ionic Liquids for Fiber Extrusion

(Broughton).... C05-AE05

Reinforcement Fabrics with Electronic Transmission Capabilities

(Thomas) F05-AE13

Efficient Biological-Chemical Protective Materials

(Gowayed with Clemson)M05-AE11

The Chemistry of Functional Finishing: Self-decontaminating Textile

Materials (Sun with Auburn)..... C02-CD06 (C02-E06)

A Strategic Model for Functional Protective Clothing (Sun)..... S02-CD01 (I02-E01)

A Model for Optimizing the Textile Complex Value Chain

(Rucker with California State Polytechnic - Pomona) S02-CD02 (I02-E02)

Sensory Science: Social and Physical Interactions in Textile

Evaluations (Kaiser with U of Delaware)..... S02-CD04 (I02-E04)

Transport Phenomena in Fibrous Substrates: Liquid and Solid

Interactions (Pan with Cornell)..... M02-CD03 (M02-E03)

Functional Fibers for Immobilization of Biomolecules

(Hsieh with Natick) M02-CD05 (M02-E05)

Nano-Porous Ultra-High Specific Surface Fibers

(Hsieh with UMassD, Natick)..... C04-CD06s

Liquid Wetting and Flow in Nano-Fibrous Systems: Multi-scale and

Heterogeneous (Hsieh with TRI)..... M04-CD01

Effects of Textile Floor Coverings on Posture Steadiness and

Locomotion Stability (Pan with Georgia Tech)..... S04-CD03

Functional Fibers via Biomimesis (Hsieh with Clemson) M05-CD01

Interactive Textile-Based Information Processing Systems

(Pan)..... S05-CD04

Biomimetic Manufacturing Of Fibers: Materials Development

(Ellison) M02-CL04 (M02-C04)

Photonic Crystal-Based Polymer Optical Fibers (Brown) M02-CL06 (M02-C06)

Ultrahydrophobic Fibers: Lotus Approach (Luzinov with Clarkson)..... C04-CL06

Distributed Sensors and Actuators via Electronic-Textiles (Jalili)M04-CL05

Poly(lactic acid) Derived Fibers with Enhanced Performance

(Smith with TRI)M04-CL07

Surface Modification of CSM Fibers Using Branched Additives

(Hirt with Florida).....M04-CL11

Cellular Encapsulation into Porous Alginate Fibers

(Brown with Rhode Island).....M04-CL13

Molecularly Imprinted Fibers with Recognition Capability (Luzinov) C05-CL01

Cornell University Management

Biologically Active Bioabsorbable Fibers for Biomedical Uses

(Chu with UTenn)..... M03-CR04

Fibrous Micro-Electro-Mechanical-Systems (MEMS) (Netravali)..... F04-CR02

Improved Apparel Sizing: Fit and Anthropometric 3D Scan Data

(Ashdown with Fashion Inst of Technology) S04-CR01

Hybrid Microporous Membranes Intended for Protective

(Obendorf with UC Davis)..... C05-CR01

Creation of a New Class of Cellulose Engineering Materials (Frey) M05-CR02

Textile Ink Jet: Drop Formation and Surface Interaction (Carr)..C02-GT07 (C02-G07)
Color Destruction in Mill Effluent via Biomimetic Methods
(Bottomley with Emory)C02-GT09 (C02-G09)
Compressive Behavior of Fiber Assemblies (Jacob)F02-GT04 (F02-G04)
Frequency Effect on Drawing Behavior of Staple Fiber Strands
(Wang with UCDavis) F04-GT01
Analysis of the Superdraw Process of Hollow Fibers (Wang) F04-GT02
Micro-Flow in Textiles (Leisen with Niederrhein Univ.)..... F04-GT05
Nano Scale Polymerization and Fiber Spinning (Jacob with Ohio St)M04-GT11
Terahertz Properties of Textiles: Metamaterials, Sensors, and Security
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Textile Fibers Engineered From Molecular Auxetic Polymers (Griffin)M04-GT21
Novel, High-Yield Application of Permanent Colorants (Beckham) C05-GT04
Inkjet Deposition of Complex Mixtures to Textiles (Carr with CCNY) C05-GT07
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Shape Memory Polymer Fibers for Comfort Wear (Cook with NC State)M05-GT14

University of Massachusetts at Dartmouth Management

Nano Engineered Fire Resistant Composite Fibers

(Patra with Auburn).....M02-MD08 (M02-D08)

Electro-Static Web Formation

(Kim with NC State).....F03-MD01

Bio-active Bandages

(Bhowmick with Harvard).....F03-MD15

Nano Crafted Layered Optical Filaments for Diffractive Colors

(Calvert with Clemson)M03-MD14

Compact Fiber-Based Bioconversion/Bio-filtration Systems

(Kim with Mass. Maritime)F04-MD11

Fracture Toughness of Through-Thickness Reinforced Composites

(Rice with MIT, US Army).....F04-MD12

Quantum Tunneling Nanocomposite Textile Soft Structure Sensors

and Actuators (Patra)M04-MD07

Cost-Effective NanoFiber Formation - Melt Electrospinning

(Warner with NJIT)F05-MD01

Direct Spinning and Fabrication: The Robospider

(Calvert)F05-MD09

Development of Layered Functional Fiber-based Microtubes

(Ghosh)..... F02-NS05 (F02-S05)

3-D Virtual Draping with Fabric Mechanics and Body Scan Data

(May-Plumlee) F02-NS08 (F02-S08)

Polymers Processed with Cyclodextrin Inclusion Compounds

(Tonelli with Ga Tech)..... M02-NS01 (M02-S01)

Ionic Crosslinking - A Novel Method of Fabric Stabilization (Smith) C04-NS01

Static Generation and Control in Textile Systems

(Seyam with Western Ontario) C04-NS07

Optimizing Color Control Throughout the Textile Supply Chain (Hinks) C04-NS11

Printing Electric Circuits Onto Non-Woven Conformal Fabric

Substrates (Pourdeyhimi) F04-NS17

Single-step Protein Surface-attachment to Electrospun Fibers

(Spontak with Max Plank)..... F04-NS26

Quantifying the Value of Information in a Supply Chain (King) S04-NS02

Boundary Lubrication and Molecular Assembly in Fiber (Rojas)..... C05-NS09

Electrospun Core-Sheath Fibers for Soft Tissue Engineering (Gupta) ... F05-NS04

High Modulus Aliphatic Nylon Fibers via Lewis-Acid C (Kotek).....M05-NS05

Hispanic Characterization System (HCS) (Jones) S05-NS04

Philadelphia University Management

Integration of Fabric Formation and Coloration

(George with NC State) C02-PH03 (C02-P03)

Universal Set of Dyes for Digital Inkjet Textile Printing (Ujje)..... C03-PH01

Sustainability as a Source of Competitive Advantage (Rusinko)..... S03-PH01

Strategies for Improving the Competitiveness of the U.S. Textile and Apparel Industries (Datta with NC State) S03-PH02

Genetic Algorithms in Molecular Design of Novel Fibers

(Sztandera with Cornell, Oxford) C04-PH02s

Genetic Algorithms in Molecular Design of Novel Fibers

(Sztandera with Cornell, Oxford) C05-PH01

Scent-Infused Textiles to Enhance Consumer Experiences (Pierce)..... F05-PH03

Abbreviations

The following abbreviations are not always defined in articles.

Auburn (AE, AC): University of Auburn, Auburn AL 36849 [E=TE;C=Consumer]	MAE: Mechanical and Aerospace Engineering	TFPS: Textile, Fiber & Polymer Science
Chem Eng: Chemical Engineering	ME: Mechanical Engineering	TRI: Textile Research Institute (Princeton NJ 08542)
CivE: Civil Engineering	M.I.T.: Mass. Inst. of Technology	UAB: Univ. of Alabama-Birmingham
Clemson (CL): Clemson University, Clemson SC 29634	NC State (NS): North Carolina State University, Raleigh NC 27695	UC-Davis (CD): University of California – Davis, Davis CA 95616-8722
Cornell (CR): Cornell University, Ithaca NY 14853	NMR: nuclear magnetic resonance	UD: University of Delaware
dpf: denier per filament	PET: poly(ethylene terephthalate)	UG: University of Georgia
DSC: differential scanning calorimetry	PhilaU (PH): Philadelphia University, Philadelphia PA 19144	UNC-G: University of North Carolina at Greenville
ESR: electron spin resonance	Poly Sci: Polymer Science	UMassD (D): University of Massachusetts at Dartmouth MA 02747
Fib: Fiber	SEM: scanning electron microscopy	UNL: University of Nebraska at Lincoln
FTIR: Fourier Transform Infrared	TAM: Textile and Apparel Management	UNO: University of New Orleans
Georgia Tech (GT): Georgia Institute of Technology, Atlanta GA 30332	[TC] ² : Textile/Clothing Technology Corp	U of PA: University of Pennsylvania
LSU: Louisiana State University	TE: Textile Engineering	U of Tenn: University of Tennessee
	TEM: transmission electron microscopy	URI: Univ. of Rhode Island
	Tex: Textile	
	TexE: Textile Engineering	
	TFE: Textile and Fiber Engineering	

Discontinued Projects

[ordered by University, then competency, then year]

The following NTC projects were discontinued because they successfully completed their maximum three-year life span (or one-year for seed projects) or because other research was of higher priority. For their last report, see the NTC website at <http://www.ntcresearch.org>, the [June 2004 NTC Research Briefs](#) (links below) or the [November 2004 NTC Annual Report](#).

You may also contact the principal investigators whose phone numbers and E-mail addresses are listed therein.

New projects often grew out of completed projects (See the notes following the listings below for any new projects).

[Novel Textile Chemistry for Dense Gas Fluids](#) (Drews with NC State) C01-CL01 (C01-C01)

[Dyeable Polypropylene via Nanotechnology](#) (Fan with UNL) C01-MD20 (C01-D20)

[Improving the Thermal Stability of Textile Processing Aids](#)

(Grant)..... C01-NS08 (C01-S08)

[Nano-Porous Ultra-High Specific Surface Fibers](#)

(Hsieh with UMassD, Natick) [see F04-CD06s] C03-CD01s

[Magnetic Ring-Spinning - Revolutionizing the Tradition](#)

(Abdel-Hady) F01-AE02 (F01-A02)

[Nonlinear Dynamics of High Speed Transport for Staple Yarns](#)

(Goswami with U. of Sydney)..... F01-CL04 (F01-C04)

["Green" Composites from Cellulose Fabrics & Soy Protein Resin](#)

(Netravali)..... F01-CR01 (F01-B01)

[Analysis and Enhancement of Carding and Spinning](#)

(Wang with Clemson)..... F01-GT06 (F01-G06)

[Applications of Micromachines in Fabric Formation](#) (Seyam)..... F01-NS14 (F01-S14)

[Modeling of Thermal Protection Outfits for Fire Exposures](#)

(Barker)..... F01-NS50 (S01-NS02/I01-S02)

[Jacquard Fabrics on Demand](#) (Donaldson) F03-NS03s

[Novel Polymeric Optical Fibers, Fiber Amplifiers, and Lasers](#)

(Ballato) M01-CL01 (M01-CL01)

[Hybrid Polymer Nanolayers for Surface Modification of Fibers](#)

(Luzinov with Iowa State) M01-CL03 (M01-C03)

[Dynamic Color Change Chameleon Fiber Systems](#)

(Gregory with Furman, Georgia Tech)..... M01-CL07 (M01-C07)

[Biodegradable Hydrogel-Textile Hybrid for Tissue Engineering](#) (Chu

with Binghamton)..... M01-CR01 (M01-B01)

[Improving the Understanding and Acceptance of Personal Protective](#)

[Equipment](#) (Obendorf) M01-CR02 (M01-B02)

[Fundamentals of High Modulus, High Tenacity Melt Spun Fibers](#)

(Michielsen)..... M01-GT01 (M01-G01)

[In-Situ Synchrotron Study during Fiber Processing](#)

(Jacob with SUNY-StoneyBrook, UMass Amherst, Ohio State)..... M01-GT04 (M01-G04)

<u>Electrostatic Spinning and Properties of Ultrafine Fibers</u> (Rutledge, M.I.T., with UMassD).....	M01-MD22 (M01-D22)
<u>Lewis Acid-Base Complexation of Polyamides</u> (Kotek with TRI) ...	M01-NS03 (M01-S03)
<u>Functional Fabric with Embedded Nanotube Actuators/Sensors</u> (Jalili)	M03-CL07s
<u>On-Line Measurement, Analysis and Feedback System</u> (Solomon with Berry College).....	S01-AC21 (I01-A21)
<u>Validity and Reliability in Measuring the Dimensions of Apparel Behavior</u> (Brannon).....	S01-AC25 (I01-A25)
<u>Body Scan Analysis for Virtual Fit Models</u> (Connell with Nottingham Trent, [TC] ² , Cornell)	S01-AC27 (I01-A27)
<u>The Role of Emotion in Success of Global Retailing</u> (Kim with Dong Hwa, Oklahoma St)	S01-AC31 (I01-A31)
<u>Developing a Design-Oriented Fabric Comfort Model</u> (El Mogahzy with Georgia Tech, NC State)	S01-AE32 (I01-A32)
<u>Use of Body Scan Data to Design Sizing Systems Based on Target Markets</u> (Ashdown with Fashion Inst of Technology).....	S01-CR01 (I01-B01)
<u>Business-to-Business Collaboration in a Softgoods E-Supply Chain</u> (King)	S01-NS01 (S01-S01)
<u>Emerging Apparel Supply Chain Configurations</u> (King)	S01-NS10 (I01-S10)
<u>3-D Electronic Imaging of Fabric Qualities by On-Line Yarn Data</u> (Suh)	S01-NS12 (I01-S12)
<u>On Line Weight and Shrinkage Control of Cotton Knits</u> (Abou-iiiana with Auburn)	S01-PH07 (I01-P07)
<u>A Fuzzy Forecasting Model for Women's Casual Sales</u> (Frank with California State Polytechnic - Pomona).....	S01-PH10 (I01-P10)
<u>Optimal Investment Strategies for Enhanced Productivity</u> (Christoffersen)	S01-PH13 (I01-P13)
<u>An Analytical Investigation of the Bullwhip Effect</u> (Warburton with St. Joseph's Univ.)	S03-MD13s