

NTC Annual Report 2008 - 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 Annual Report 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 Annual Report or in the 2008 Research Briefs, on the web at <http://www.ntcresearch.org/pdf-rpts/Bref0608/Briefs08-TOC.pdf> or on the latest CD/ROM. You can keyword search and view all NTC Reports ever published at <http://www.ntcresearch.org/PDFindex.html> and view all reports on the CD.

To contact any principal investigator, see their bio following each Research Brief for their email address, phone, web-site 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 Annual Report by Competency Groups

Materials

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

Efficient Biological-Chemical Protective Materials

We are developing the fundamental knowledge to design "breathable" fabrics that also provide barrier protection from biological and chemical hazards. (Gowayed with Clemson) [M05-AE11]

Functional Fibers via Biomimesis

We are developing a fundamental understanding of how liquid wets and flows in nanoporous fibers and nanofibrous substrates. (Hsieh with Clemson, Natick) [M05-CD01]

New Cellulose Engineering Materials

We are developing a fundamental understanding of the cellulose dissolution process to create a new class of cellulose engineering materials. (Frey with NC State) [M05-CR02]

Shape Memory Polymer Fibers for Comfort Wear

We are using chemical and mechanical shape memory effects to develop fibers that change their shape in response to external stimuli, e.g. temperature, for enhanced fabric comfort. (Cook with NC State) [M05-GT14]

High Modulus Aliphatic Nylon Fibers via Lewis-Acid Complexation

By forming a Lewis acid - nylon 66 complex to reduce hydrogen bonding during drawing, we have produced high melting, ultra-high modulus and high strength fibers. (Kotek with Long Island U.) [M05-NS05]

Fibers for Textile-Based Electrical Energy Storage

Our goal is to fabricate and test fiber-based capacitors suitable for storing electrical energy in multifunctional textile products. (Creager with Old Dominion) [M06-CL07]

Hierarchically Designed and Conductive Elastomeric Fibers

By engineering molecular conformations, we are developing elastomeric polymers and fibers with improved mechanical properties and tunable electrical conductivity. (Jacob with UMass Amherst) [M06-GT03]

[Textile Based Carbon Nanostructured Flexible Antenna](#)

We are researching micro-droplet deposition of carbon nanotube-based conducting electronic inks on textiles for printed circuits and systems, such as antenna. (Patra with RPI, Colorado St) [M06-MD01]

[Improving Textiles with Cyclodextrins](#)

We are exploiting the tendency of cyclodextrins to form inclusion compounds with many small molecule additives and polymers to improve/enhance textile properties. (Tonelli with Georgia Tech) [M06-NS02]

[Deployable Wet-Responsive Fibrous Materials](#)

We are designing active fibrous materials which respond to stimuli by spontaneously folding-unfolding their structures for uses, such as geotextiles that become stronger upon wetting. (Kornev) [M08-CL10]

[Fiber Based Biohazard Sensor Assemblies](#)

We are developing fibrous assemblies with molecular biohazard sensors capable of detecting and capturing biohazards. (Frey) [M08-CR01]

[Authentication/Anti-Counterfeit Fibers](#)

Verb? We are developing an anti-counterfeit device made of fibers and fluorescing nanoparticles that appear identical to conventional fibers until exposed to a specific wavelength of light. (Frey with UPR) [M08-CR05]

[Flexible Electrodes for Electroluminescent Textiles](#)

We are developing inkjet printing of flexible composite transparent electrodes, based on carbon nanotubes, for electroluminescent displays. (Calvert with Rice Univ.) [M08-MD07]

[Nanoscale Surface Embrittlement of Fibers](#)

We seek to fundamentally understand the mechanism at the molecular level of fiber surface embrittlement due to free radical oxidation at melt extrusion and to find ways to minimize it. (Chalivendra) [M08-MD13]

Fabrication

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

[Reinforcement Fabrics with Electronic Transmission Capability](#)

We are developing fundamental knowledge to understand how to design geotextile roadbed liners embedded with antennae and electronic transmission capability. (Thomas) [F05-AE13]

[Demand Activated Toughening in Ballistic Protective Garments](#)

To design comfortable, ballistic protective garments, we are developing an understanding of shock-induced chemical reactions that convert flexible polymers to hard ceramic materials. (Jacob) [F05-GT04]

[Electrospun Bicomponent Fibers for Tissue Engineering](#)

We are developing electrospun bi-component nanofiber structures, using biodegradable polymers for application as scaffolds for tissues engineering. (Gupta) [F05-NS04]

[Scent-Infused Textiles to Enhance Consumer Experiences](#)

We are developing polymer fibers that incorporate effective, long-lasting fragrances for innovative and marketable textiles and to measure their psychology of acceptance. (Pierce) [F05-PH03]

[Direct Writing Biological Patterns & Constructs onto Fabrics](#)

We are exploring the knowledge of direct writing biological patterns and constructs onto fabrics to create textile-based bio/medical microdevices. (Huang with RPI) [F06-CL02]

[Nanolayer Self-assemblies: Novel, Adaptable Fiber Surfaces](#)

Nanolayers, nanoparticles or thin films when deposited on textile substrates impart value-added properties without compromising fabric comfort or mechanical properties. (Hinestroza with NC State) [F06-CR02]

[Ultra-fine Filament Yarns Made by Supersonic Jet Splitting](#)

We are developing the fundamental understanding to lead to a new approach towards cost-effective production of ultra-fine continuous filament yarns. (Yao) [F06-GT01]

[Piezoelectric Fabrics for Energy Harvesting](#)

Piezoelectric fabrics are ideally suited to power wearable electronics, an application where bulky batteries are very impractical. (Guillot) [F06-GT05]

[Transport in 3-D Nanofab Geometries](#)

We are developing experimental and numerical fluid transport models for 3D nanofabricated devices. (Bhowmick with Natick)[F06-MD04]

[Formation and Performance of Auxetic Textiles](#)

We have combined our knowledge of geometry and fabric structural characteristics to produce auxetic knit structures from non-auxetic yarns. (Ugbolue) [F06-MD09]

[Blue-Cured Adhesives for Bonding and 3-D Medical Textiles](#)

We are exploring the use of blue light instead of UV to rapidly cure bonding resins and to build 3-D fabric structures for biomedical uses, such as tissue engineering. (Calvert with UMass Lowell) [F06-MD14]

[Environmental Fabrics and Breathing Wall Systems](#)

We are developing fabric and modular wall assemblies to retrofit existing buildings to combat Sick Building Syndrome and will be developing multiple skins structures. (Messinger) [F06-PH03]

[Cellulose/Soy Protein Based "Green" Composites](#)

We are developing "Green" composites with good mechanical properties using sustainable cellulosic fibers and plant-based resins based on modified soy proteins. (Netravali with Auburn) [F08-CR01]

[Polymer Flow Within Elastic Boundaries: Stronger Continuous Nanofibers](#)

We are understanding fundamental flow phenomena in bicomponent extrusion that allows the production of ultra-strong fibers from commodity polymers (Hinestroza with Georgia Tech) [F08-CR02]

[Engineered Reinforced Structures from Short Fibers](#)

From short fibers, we are developing electrostatic webs with desired orientation and high aspect ratios to produce engineered composite structures with superior, consistent properties. (Kim with NC State) [F08-MD01]

[Fiber-Based Bioreactor Media for Air Pollution Control](#)

We are determining the efficacy of using flocked surfaces as air biofiltration media to curb air pollution and to bioconvert volatiles into useful products. (Yang) [F08-MD02]

Chemistry

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

[Molten Organic Salts as Solvents for Fiber Extrusion](#)

We are investigating using molten organic salts as solvents for the extrusion of stiff and/or polar materials, including cellulose. (Broughton with U. of Alabama) [C05-AE05]

[Textiles with Highly Selective Receptors for Specific Molecules](#)

By molecular imprinting polymers on fibers, we are designing novel functionalities with molecular recognition capability for molecular separation, isolation, immobilization and sensing. (Luzinov) [C05-CL01]

Antimicrobial Membranes for Protective Clothing

Antimicrobial membranes for protective clothing kill bacteria upon contact. (Obendorf with UC Davis) [C05-CR01]

High-Yield Application of Permanent Colorants

We are incorporating ionic functional groups into textile colorants and finishes to increase add-on and then permanency via subsequent *in situ*, thermally-induced, covalent bond formation. (Beckham) [C05-GT04]

Inkjet Deposition of Complex Mixtures to Textiles

We are developing a fundamental understanding of the process of deposition of complex mixtures. (Carr with CCNY) [C05-GT07]

Boundary Lubrication and Molecular Assembly

We are elucidating the structural characteristics of the boundary layer adsorbed on fiber surfaces that controls wear and friction during textile processing. (Rojas with Cornell, UC Santa Barbara) [C05-NS09]

Self-Decontaminating Textiles

We are developing chemical systems that will prevent/remove toxic contaminants from textile fabrics and surfaces. (Slaten with UC-Davis) [C06-AC01]

Effect of Silicone Finishes on the Burning Behavior of PET

To mitigate adverse silicone interactions, we are developing fundamental understanding of the impact of siloxanes on the burning behavior of polyester fibrous structures. (Drews with U of Georgia) [C06-CL01]

Hydrodynamic Lubrication in Fiber Processing

We are expanding our fundamental understanding of the mechanisms of hydrodynamic fiber lubrication to aid in the development of future generations of fibers and fiber lubricants. (Krause) [C06-NS07]

Development of Drug Eluting Textile Stents

We are developing drug-eluting vascular stents made from braided textiles, which are more flexible than metal stents, thus more amenable to the pulsatile flow in blood vessels. (Adanur of Auburn) [C08-CL03]

Systems

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

Masculine Fashion Choices: Shifting Identities

We aim to understand how the shifting male consumer culture thinks about fashion and lifestyle issues and how men evaluate and purchase clothing. (Solomon with Berry, UC Davis, Delaware, Cornell) [S05-AC02]

Fabric/Skin Interactions: Contact, Friction and Dynamic Motion

We are developing multi-scale models of physical and physiological interactions between fabric and skin, such as contact and friction, and the impact of dynamic motion (e.g. walking). (Pan with UCSF) [S05-CD04]

Hispanic Characterization System

This is the first comprehensive, empirical research system designed to generate a multidimensional profile of the U. S. Hispanic market in terms of textile and apparel needs and preferences. (Jones) [S05-NS04]

Strategic Sustainability and the Triple Bottom Line

We are examining how sustainability practices in the apparel-textile complex relate to economic, social and environmental goals in apparel, furnishings and artificial turf. (Solomon with Berry College) [S06-AC01]

Apparel Product Development for Plus-sized Tween & Teen Boys

We are investigating the physical and social-psychological dimensions of demand for apparel by tween boys (aged 9-14), particularly those who are overweight and obese. (Connell with [TC]²) [S06-AC03]

Visual Approach to Assessing Apparel Brand Personalities

We are developing a visual lexicon of brand personality that links apparel brands with the meanings a standardized set of images evoke for improved market positioning. (Solomon with Berry) [S06-AC04]

Research Network on Multifunctional Protective Clothing

We are forming a group of researchers and manufacturers to focus on multifunctional protective clothing and materials for firefighters, paramedics and police officers. (Sun with Auburn, Cornell) [S06-CD01]

Dynamic Textile Process and Quality Control Systems

This Dynamic Quality/Process Control System utilizes all structural equations known to date to design an effective, dynamically responsive system. (Suh) [S06-NS02]

Pivotal Role of Brand Image in Purchase Decisions

We are examining the pivotal role of how brand image secures favorable attitudes, purchase intentions and price premiums for U.S. apparel products in multi-channel markets. (Forsythe) [S08-AC01]

Scientific Approaches for Preventing Cotton Variety Identity Theft

To prevent cotton identity theft, we are developing ways to fully identify specific cotton fiber varieties not only in the raw stage but also in finished end products. (El Mogahzy) [S08-AE10]

Visual Fit Assessment Tool for Apparel Firms

We are developing a tool for capturing and analyzing fit using 3D body scan technology that can be used by apparel firms both for in-house fit models and target market customers. (Ashdown) [S08-CR03]

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.

NTC Annual Reports by Project Management

Auburn University (Consumer Affairs) Management

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

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

Self-Decontaminating Textiles (Slaten).....C06-AC01

Strategic Sustainability and the Triple Bottom Line

(Solomon with Berry College) S06-AC01

Apparel Product Development for Plus-sized Tween & Teen Boys

(Connell with [TC]²) S06-AC03

Visual Approach to Assessing Apparel Brand Personalities

(Solomon with Berry) S06-AC04

The Pivotal Role of Brand Image in Purchase Decisions (Forsythe) S08-AC01

Auburn University (Engineering) Management

Investigation of Organic Ionic Liquids for Fiber Extrusion

(Broughton with U of Alabama) C05-AE05

Reinforcement Fabrics with Electronic Transmission Capability

(Thomas) F05-AE13

Efficient Biological-Chemical Protective Materials (Gowayed with Clemson) M05-AE11

Developing Scientific Approaches for Preventing Cotton Variety Identity Theft (El Mogahzy) S08-AE10

University of California at Davis Management

<u>Functional Fibers via Biomimesis</u> (Hsieh with Clemson,Natick)	M05-CD01
<u>Fabric and Skin: Contact, Friction and Interactions</u> (Pan).....	S05-CD04
<u>Integrated Production of Functional Fibers and Nonwovens</u> (Sun)	M06-CD04
<u>Research Network on Multifunctional Protective Clothing</u> (Sun with Auburn, Cornell)	S06-CD01

Clemson University Management

<u>Molecularly Imprinted Fibers with Recognition Capability</u> (Luzinov)	C05-CL01
<u>Effect of Silicone Finishes on the Burning Behavior of PET</u> (Drews with U of Georgia)	C06-CL01
<u>Direct Writing Biological Patterns & Constructs onto Fabrics</u> (Huang with Naval Research)	F06-CL02
<u>Fibers for Textile-Based Electrical Energy Storage</u> (Creager with Old Dominion)	M06-CL07
<u>Development of Drug Eluting Textile Stents</u> (Adanur)	C08-CL03
<u>Deployable Wet-Responsive Fibrous Materials</u> (Kornev)	M08-CL10

Cornell University Management

<u>Hybrid Microporous Membranes Intended for Protective Clothing</u> (Obendorf with UC Davis).....	C05-CR01
<u>Creation of a New Class of Cellulose Engineering Materials</u> with NC State)	(Frey M05-CR02
<u>Nanolayer Self-assemblies: Novel, Adaptable Fiber Surfaces</u> (Hinestroza with NC State)	F06-CR02
<u>Cellulose/Soy Protein Based "Green" Composites</u> (Netravali)	F08-CR01
<u>Polymer Flow in Confined Elastic Boundaries: Stronger Continuous Nanofibers</u> (Hinestroza)	F08-CR02
<u>Fiber Based Biohazard Sensor Assemblies</u> (Frey)	M08-CR01
<u>Authentication/Anti-Counterfeit Fibers</u> (Frey)	M08-CR05
<u>Development of Visual Fit Assessment Tool for Apparel Firms</u> (Ashdown)	S08-CR03

Georgia Institute of Technology Management

<u>Novel, High-Yield Application of Permanent Colorants</u> (Beckham)	C05-GT04
<u>Inkjet Deposition of Complex Mixtures to Textiles</u> (Carr with CCNY)	C05-GT07
<u>Demand Activated Toughening in Garments</u> (Jacob).....	F05-GT04
<u>Shape Memory Polymer Fibers for Comfort Wear</u> (Jacob with NC State).....	M05-GT14
<u>Ultra-fine Filament Yarns Made by Supersonic Jet Splitting</u> (Yao)	F06-GT01
<u>Piezoelectric Fabrics for Energy Harvesting</u> (Guillot)	F06-GT05
<u>Hierarchically Designed and Conductive Elastomeric Fibers</u> (Jacob with UMass Amherst)	M06-GT03

Transport in 3-D Nanofab Geometries (Bhowmick with Natick) F06-MD04

Formation and Performance of Auxetic Textiles (Ugbolue) F06-MD09

Blue-Cured Adhesives for Bonding and 3D Medical Textiles
(Calvert with UMass Lowell) F06-MD14

Engineered Reinforced Structures from Short Fibers (Kim) F08-MD01

Fiber-Based Bioreactor Media for Air Pollution Control (Yang) F08-MD02

**Carbon Nanotube Based Flexible Textile Electrodes for Electrolumi-
nescent Device** (Calvert) M08-MD07

Nanoscale Surface Embrittlement of Fibers (Chalivendra) M08-MD13

North Carolina State University Management

Boundary Lubrication and Molecular Assembly in Fiber

(Rojas with Cornell, UC Santa Barbara)..... C05-NS09

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

High Modulus Aliphatic Nylon Fibers via Lewis-Acid Complexation

(Kotek)M05-NS05

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

Improving Textiles with Cyclodextrins (Tonelli with Georgia Tech) M06-NS02

Hydrodynamic Lubrication in Fiber Processing (Krause) C06-NS07

Dynamic Textile Process and Quality Control Systems (Suh) S06-NS02

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

Environmental Fabrics and Breathing Wall Systems (Messinger) F06-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	UPR: Univ. of Puerto Rico
	Tex: Textile	URI: Univ. of Rhode Island
	TexE: Textile Engineering	
	TFE: Textile and Fiber Engineering	

Discontinued Projects

[ordered by year, then competency, then University]

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 [November 2007 NTC Annual Report](#) (link below) or the [June 2007 NTC Research Briefs](#). 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).

<u>Ultrahydrophobic Fibers: Lotus Approach</u> (Luzinov with Clarkson).....	C04-CL06
<u>Ionic Crosslinking - A Novel Method of Fabric Stabilization</u> (Smith)	C04-NS01
<u>Static Generation and Control in Textile Systems</u> (Seyam with Western Ontario)	C04-NS07
<u>Optimizing Color Control Throughout the Textile Supply Chain</u> (Hinks with Clemson).....	C04-NS11
<u>Genetic Algorithms in Molecular Design of Novel Fibers</u> (Sztandera with Cornell, Oxford)	C05-PH01
<u>Coated and Laminated Fabrics for Fuel Cells</u> (Adanur with UMassD)	F04-AE01
<u>Fibrous Micro-Electro-Mechanical-Systems (MEMS)</u> (Netravali).....	F04-CR02
<u>Frequency Effect on Drawing Behavior of Staple Fiber Strands</u> (Wang with UCDavis)	F04-GT01
<u>Analysis of the Superdraw Process of Hollow Fibers</u> (Wang with East Carolina U.)	F04-GT02
<u>Micro-Flow in Textiles</u> (Leisen with Niederrhein Univ.).....	F04-GT05
<u>Compact Fiber-Based Bioconversion/Bio-filtration Systems</u> (Kim)	F04-MD11
<u>Fracture Toughness of Through-Thickness Reinforced Composites</u> (Rice).....	F04-MD12
<u>Printing Electric Circuits Onto Non-Woven Conformal Fabric Substrates</u> (Pourdeyhimi).....	F04-NS17
<u>Single-step Protein Surface-attachment to Electrospun Fibers</u> (Spontak with Max Plank).....	F04-NS26
<u>Cost-Effective NanoFiber Formation - Melt Electrospinning</u> (Warner with NJIT)	F05-MD01
<u>Direct Spinning and Fabrication: The Robospider</u> (Calvert)	F05-MD09
<u>Liquid Wetting and Flow in Nano-Fibrous Systems: Multi-scale and Heterogeneous</u> (Hsieh with TRI).....	M04-CD01
<u>Distributed Sensors and Actuators via Electronic-Textiles</u> (Jalili)	M04-CL05
<u>Poly(lactic acid) Derived Fibers with Enhanced Performance</u> (Smith with Long Island U).....	M04-CL07

<u>Surface Modification of CSM Fibers Using Branched Additives</u> (Hirt with U of Florida).....	M04-CL11
<u>Cellular Encapsulation into Porous Alginate Fibers</u> (Brown with U of Rhode Island).....	M04-CL13
<u>Nano Scale Polymerization and Fiber Spinning</u> (Jacob with Ohio St)	M04-GT11
<u>Textile Fibers Engineered From Molecular Auxetic Polymers</u> (Griffin)	M04-GT21
<u>Quantum Tunneling Nanocomposite Textile Soft Structure Sensors and Actuators</u> (Patra)	M04-MD07
<u>Integrated Production of Functional Fibers and Nonwovens</u> (Sun)	M06-CD04
<u>Textile Based Carbon Nanostructured Flexible Antenna</u> (Patra with RPI) ..	M06-MD01
<u>Apparel Product Development for the Plus-Sized Tween and Teen Market</u> (Connell with [TC] ²)	S04-AC01
<u>Effects of Textile Floor Coverings on Posture Steadiness and Loco- motion Stability</u> (Pan).....	S04-CD03
<u>Improved Apparel Sizing: Fit and Anthropometric 3D Scan Data</u> (Ash- down with UC Davis).....	S04-CR01
<u>Quantifying the Value of Information in a Supply Chain</u> (King).....	S04-NS02