CIRCUITEX CONDUCTIVE SMART MATERIAL

TECHNOLOGY THAT CONNECTS FABRIC TO YOUR DIGITAL WORLD

circuitex®
Conductive Smart Material

SMART FABRIC TECHNOLOGY

Advancements in technology are changing the way both manufacturers and end users interact with the world. As global markets move at an increasingly faster pace, smart materials enable organizations to enhance their capabilities and radically redefine the sales paradigm so they can compete more effectively and win more business.

CIRCUITEX Smart Material Technology by NOBLE is engineered to meet the demands of today's, and tomorrow's, technical advancements.

Offering the most advanced options, our smart, soft surface materials elevate interactions among people, products, and data sources. Trusted by leaders of industry and the most discerning product engineers, our technology is used by NASA, Lockheed Martin, Northrup Grumman, and Boeing, as well as U.S. and Allied Special Forces.

FABRIC CONNECTION FOR GLOBAL DEMANDS

We are NOBLE - the global leader in fiber science. Our smart technologies are developed to power products that solve real problems; protecting, saving, healing, and improving lives. We consider this **The Noble Advantage**.

THE DEMAND FOR A MATERIAL ADVANTAGE

The world is getting smarter exponentially. Demand for smart conductive materials is omnipresent. Fortunately, the engineers at NOBLE are ahead of the game. CIRCUITEX Conductive Smart Material, developed with state-of-the-art polymer science, delivers smart, soft fabric materials at levels previously unobtainable.

- Heated Fabric
- Energy Scavenging
- Energy Storage
- Biometric Monitoring
- Thermal Conductivity
- IOT Fabrics and Materials
- Pressure-Sensitive Solutions
- Smart Wearables
- Conductive Pathways
- Fabric Sensors

TECHNOLOGY THAT CHANGES THE MARKET

FABRIC METALLIZATION

Using proprietary technology, CIRCUITEX Conductive Smart Material permanently bonds pure silver to the surface of polymer substrates, including yarn, fiber, fabric, tape, and foam. For superior design flexibility, the material can be blended with natural or man-made fibers. The result is a highly conductive, durable, flexible, washable material with 360° permanent encapsulation coating.

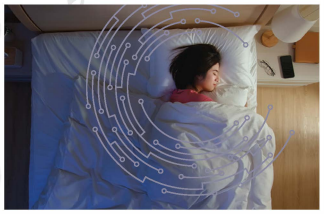
- Superior performance
- Covalent chemical bond
- Micron-thin coating
- Super lightweight construction
- Textile integrity, polymer properties unchanged (stretch, durability)
- Permanent (lasts for the life of the polymer)
- Inherent antimicrobial construction with conductivity optimization

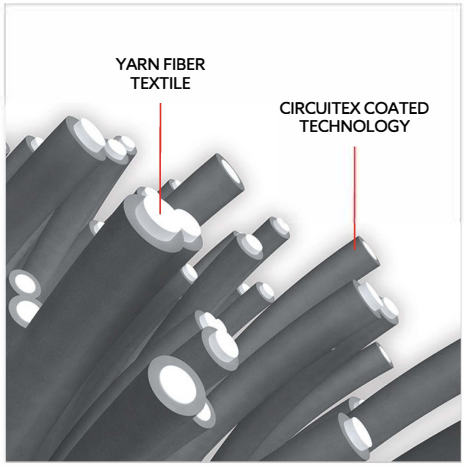
MARKET APPLICATIONS THAT ARE CHANGING THE WORLD RAPIDLY:

FABRICS AND MATERIAL THAT CHANGE WITH THE TIMES AND TECHNOLOGY

CIRCUITEX Conductive Smart Material transmits data.

- Medical and healthcare smart fabric technology
- Footwear, apparel, and accessories
- Home and office fabric furnishings
- Bedding, home, and interior design
- Soft surface transport (smart bagging)
- Automotive, rail, air, and float fabric furnishings
- Hospitality and industrial interior design
- Drapery, wall coverings, and insulation





OPTIMUM MATERIAL CONSTRUCTION

METALIZING MATERIAL THAT MOVES DATA

CIRCUITEX Conductive Smart Fabric delivers soft surface, lightweight, flexible materials for a broad spectrum of conductive applications.

BIOMETRICS

Nothing transmits a signal better than silver. With 100% surface area coverage and uniform conductivity, CIRCUITEX uses permanently bound silver to transmit small electrical signals from the body.

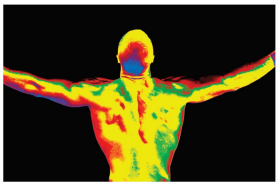
A flexible substrate, CIRCUITEX technology helps make items - like apparel, footwear, and bedding - smarter and more comfortable, while providing information critical to understanding how the body performs in the absence of uncomfortable, hard materials.

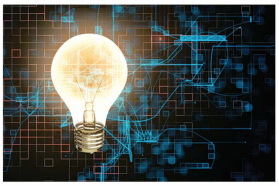
HEAT GENERATION AND TRANSFER

As silver is the most thermally conductive element on Earth, it works brilliantly as a technology integration to power heated fabrics. Using CIRCUITEX, these intelligent, wearable electronic textiles can be lighter and more comfortable than ever before.

ENERGY

As innovation continues to reduce the power needed to drive wearables and other fabric technology, scavenging and harnessing energy from body movement, body heat, or event solar radiation can now generate the power needed to shift soft surface electronics away from batteries.





CONSTRUCTION AND DELIVERABLES

ELEMENTAL CAPABILITIES

- Material choices include Silver, Copper, and other conductive options
- Compatible with the addition of carbon, graphene, conductive inks, and other coatings
- Different fabric construction and additional coatings, like polyeurethane, acrylics, and a variety of other materials, are available
- Multiple plies can be utilized to smart material performance

CIRCUITEX FABRICS

- Available in a variety of weights (OPSY/gsm) and levels of conductivity (Ω/square) to fit a wide range of technical needs

CIRCUITEX YARNS

- Available in a variety of deniers
- Highly durable
- Can easily be integrated into standard textile processes
- Yarn conductivity options can be tailored as needed, and are available in varying levels of electrical conductivity

CIRCUITEX PRINTING

- Digital printing on fabric
- Traditional screen, wet printing

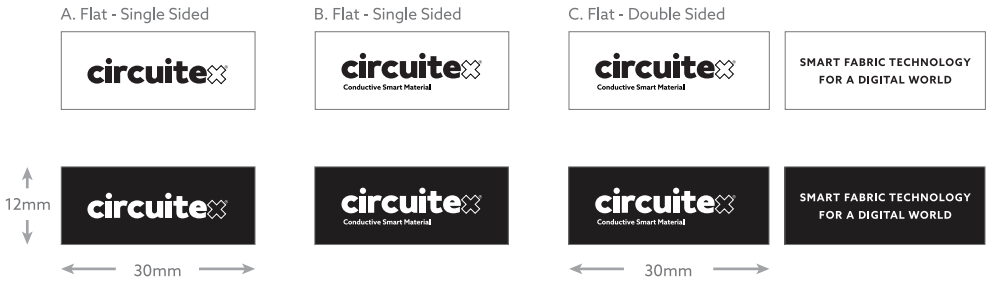
CIRCUITEX DRAPES AND WALLPAPERS

- Large-format papers for covering walls of any size

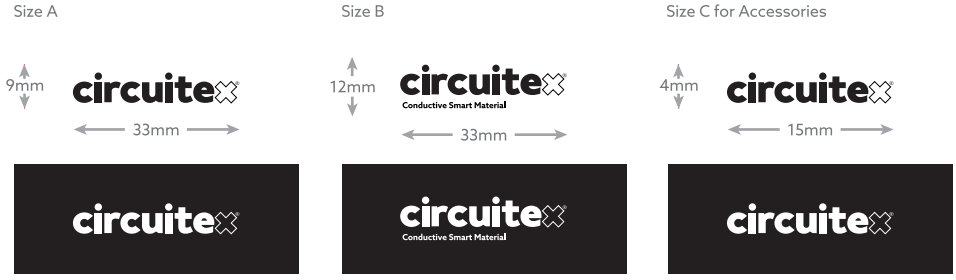
CIRCUITEX BRAND SUPPORT FOR ALL END USE PRODUCTS*

HANGTAGS One universal, multilingual tag for all products in all sizes, printed on 100% recycled paper

PRINTED FABRIC LABELS A universal label: three styles, positive and reverse designs



HEAT TRANSFERS A universal emblem: three styles, positive and reverse designs



* Additional languages for Asia available upon request. Brand support is complimentary on orders that are placed 60 days before in-hand date. To order, visit noblebiomaterials.com/company/#support.

REGULATORY AND AFFILIATIONS

US FOOD & DRUG ADMINISTRATION
Class 1 & 2 Medical Device Approvals

EUROPEAN COMMUNITY CERTIFICATION
Cleared for use in Class 1, 2 and 3 Medical Devices

EU DIRECTIVE 2002/95/EC

EU REGULATION (EC) No. 1907/2006

BLUESIGN System Partner

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NOBLE Biomaterials is a global leader in antimicrobial and conductivity solutions for soft-surface applications. The company produces advanced material technologies designed for mission-critical applications in the performance apparel, healthcare, industrial, and emerging wearable technology markets. Its flagship brands, X-STATIC®, IONIC+™, and CIRCUITEX®, are used by world-class licensees to provide odor elimination, infection prevention/management, biometric monitoring, and conductive protection benefits. Our headquarters and manufacturing facilities are located in Scranton, Pennsylvania, and we have a network of offices across Europe, Asia, and South America. Learn more at NobleBiomaterials.com.

NOBLE | THE BIOMATERIAL ADVANTAGE

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