

## Technical Information



### About Thunderon® Acrylic Fibers

#### Structure of Thunderon®

**Thunderon®** is a newly invented multi-function fiber developed through the accumulated techniques of Nihon Sanmo Dyeing Co., Ltd.

**Thunderon®** fiber is made by impregnating copper sulfide chemically onto the surface of synthetic fiber using a unique technology invented by Sanmo.

- The fiber's diameter is as fine as 15-19 μm
- The fiber's conductive layer is as thin as 300-1,000Å
- The fiber has an electrical specific resistance of  $1.0 \times 10^{-2} \sim 10^{-3} \text{ W cm}$ .

Owing to such conductive layer construction and good electrical conductivity, **Thunderon®** shows superb corona discharge characteristics. It also has strong anti-bacterial properties due to the copper on the surface, and it prevents odor.

#### Specific Resistance of Thunderon®

Specific Resistance (W cm)	-----Conductive-----					Dissipative					-----Insulative-----									
Material	$10^{-5}$	$10^{-4}$	$10^{-3}$	$10^{-2}$	$10^{-1}$	10	$10^1$	$10^2$	$10^3$	$10^4$	$10^5$	$10^6$	$10^7$	$10^8$	$10^9$	$10^{10}$	$10^{11}$	$10^{12}$	$10^{13}$	$10^{14}$
Metal Fiber	-----																			
Metal Plated Fiber	-----																			
Thunderon	-----																			
Carbon Compound Fiber	-----																			
Anti-Static Chemical Finishing	-----																			
Wool	-----																			
Acrylic, Polyester	-----																			
Rubber	-----																			

#### Particle Size of Thunderon® Acrylic Fibers for Coatings

Denier per Filament x Length (mm)

>2.0 dpf. x 2mm

>2.0 dpf. x 1mm

>2.0 dpf. x 0.5mm

### Introduction to Thunderon® Acrylic Fibers

#### 1. What is Thunderon®?

**Thunderon®** Acrylic fibers are a proprietary technology invented by Nihon Sanmo Dyeing Co., Ltd. Basically, it uses a chemical reaction to bond the molecules of copper sulfide with the molecules of the host fibers.

The structure of the fiber consists of the outer conductive layer surrounding completely the inner part of the host fiber. **Thunderon®** is different from metal plated fibers or carbon compounded fibers, because the outer layer becomes part of the host fiber itself.



By forming such construction, **Thunderon**<sup>®</sup> has much better resistance to physical abrasion. Its physical structure gives it durability against abrasion unlike other anti-static fiber materials. It does not break as easily as stainless steel fiber due to its elasticity, and the conductive outer layer does not fall off as with metal plated or carbon compounded fibers.

## 2. Corona Discharge

One of the most significant advantages of **Thunderon**<sup>®</sup> is a corona discharge performance superior to other anti-static materials. Corona discharge is considered the discharge in which electrical energy is very small and does not cause sparks. A fine anti-static material near to the surface of statically charged material will ionize the air, which acts as a carrier of electrons from charged material to such anti-static material. There are several basic conditions which will determine the performance of corona discharge:

- The gap between the charged material and the anti-static material.
- The diameter of the anti-static material. The finer the material, the more effective discharge will be gained.
- The numbers of anti-static materials.

**Thunderon**<sup>®</sup> is the ideal material to introduce such corona discharge when compared to other anti-static fibers, because the conductive layer of the fiber is very thin, thus making it possible to obtain the finest anti-static material among the many anti-static materials currently available.

## 3. Anti-Microbial Effects

**Thunderon**<sup>®</sup> is a technology having more than electrical performance. Since this fiber utilizes a copper compound as the conductive element, it has the characteristics of copper itself. One of the most important characteristics of copper is that it performs as an anti-microbial agent when used in hygienic products or medical products, as well as offering odor prevention in everyday products. This effect is confirmed to work on such microbials as MRSA (Methicillin-resistant *Staphylococcus aureus*) in vitro test with a fabric containing **Thunderon**<sup>®</sup> fiber.