



# THERMAL COOLING

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Graphene Technology & Thermal  
Cooling Properties

Thermal Regulation · Heat Dissipation · UV Protection





# ARMOR GUYS

## GRAPHENE TECHNOLOGY & THERMAL COOLING

***Armor Guys is using patented, breakthrough technology to infuse their Kyorene® & Kyorene® Pro protective gloves with graphene.***

Graphene is being increasingly explored in textiles for its thermal management properties, especially in cooling and heat dissipation and Armor Guys is at the forefront of this movement.

Armor Guys' parent company, QS Safety, began R&D into graphene in 2009. By 2015, QS Safety had successfully figured out how to integrate graphene into the yarn of work gloves. Armor Guys officially launched the first range of graphene-infused work gloves to the market that same year.

Here's a breakdown of how graphene enables thermal cooling in textiles, its mechanisms, applications, and benefits:

### **How Graphene Provides Thermal Cooling in Textiles:**

#### **High Thermal Conductivity**

Graphene has an exceptionally high thermal conductivity (up to ~5000 W/m·K), which allows it to rapidly conduct heat away from the body. In fabrics, graphene layers or coatings can spread and dissipate body heat more evenly

across the surface, reducing hot spots.

#### **Far-Infrared (FIR) Radiation Management**

Graphene can reflect and manage far-infrared radiation, allowing for better heat regulation. Some graphene-enhanced fabrics reflect body-emitted infrared away, promoting a cooling effect.

#### **Moisture-Wicking Enhancement**

When integrated with hydrophilic layers, graphene fabrics can enhance sweat evaporation, leading to cooling via evaporative effects.

#### **Antistatic & Breathable**

Graphene coatings often retain breath-ability, while also being antistatic, helping with comfort and microclimate regulation close to the skin.

Graphene-infused yarn







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## How Armor Guys Integrates Graphene Into Gloves:

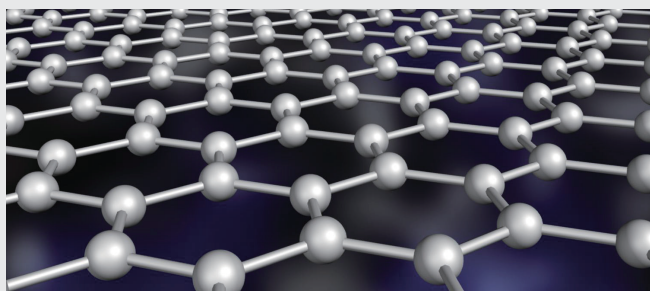
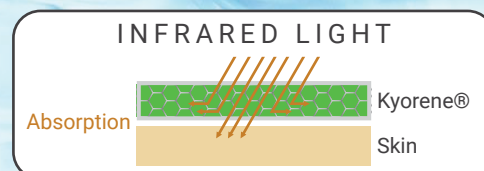
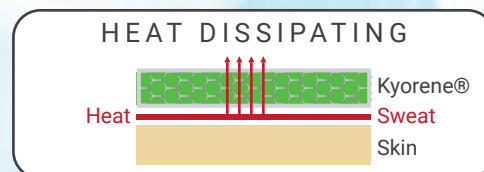
1. We take raw graphite and separate it down to the appropriate layers to which it becomes graphene.
2. Next, we liquefy the graphene turning it into Graphene Oxide (GO).
3. From there, we covalently bond the Graphene Oxide (GO) to host yarns.
4. As a result of the covalent bonding, the graphene cannot flake, shed, or come off the host yarn.

## Advantages of Graphene Cooling in Textiles:

- Enhanced sweat wicking & heat dissipation
- Temperature regulation
- Keeps wearer cooler in hot climates
- Thermal comfort
- Lightweight & flexible
- Durable & washable
- Eco-Friendly
- Conductive
- UV protection

## Applications of Graphene in Textiles:

- Apparel: denim, undergarments, athletic wear, casual attire, socks
- Outdoor gear: ski-wear, outerwear
- Home textiles: mattress ticking, towels, bedding
- PPE: gloves, masks, sleeves, jackets
- Domestic & industrial appliances: water filtration systems, toothbrushes



Graphene's honeycomb lattice construction