What is graphene? In 2004, two scientists using scotch tape to peel Graphite from a lead pencil discovered the world’s first two-dimensional material known today as Graphene. Graphene has been found to be 200 times stronger than steel, harder than diamond, all while only one atom thick. Its properties seemed magical: imperviousness to heat, acid, infrared and ultraviolet; thermal and electrical conductivity; ability to filter biological and chemical agents; resistance to abrasion; flexible, durable, anti-friction, ...These properties stem from a unique atomic configuration of maximally active electrons in a stable lattice. Graphene technologies could potentially be used anywhere—protective gloves, high performance clothing, home textiles, solar panels, construction, water filtration and even in batteries.

Who is Armor Guys? Armor Guys is the U.S. based sales and marketing division of QS Group, one of the world’s largest manufacturers of hand, arm and body protection. QS Glove has been manufacturing hand, arm and body protection for more than 25 years and has been supplying the U.S. market with gloves for a number of years. The core of our group’s vision is to protect people and environment, which led us to invest in a new division, QS Solar, which produces solar panels and is involved in the installation of large scale solar fields in Europe and Asia. In 2009, QS Group further invested in the development of graphene material and in late 2015, QS was able to scale up graphene production and became one of the first manufacturers of graphene materials on a large scale basis and the first glove manufacturer to be vertically integrated from the development of raw material to the conception of the final product.

After more than 25 years in the glove business, we often get comments like “gloves are just gloves”, meaning it does not require a lot of effort or know how to make. We completely disagree with this comment and as a company, we continually seek to innovate new products that enhance wearer comfort and safety. As a company that designs and manufactures hand protection, it is important to design gloves that fit well and provide the needed protection. Not all that long ago, the majority of gloves sold were either leather palm or brown jersey styles. With the innovation of seamless knitting machines and the advent of flat dipping technology, users now have options for gloves that provide fit, form and function that are extremely comfortable to wear. As an early adopter of this technology, QS Group invested heavily in Japanese made Shima Seiki knitting machines and built numerous flat dip production lines to offers seamless gloves coated in a variety of polymers that include; nitrile, latex, polyurethane and water borne polyurethane.

1- UV protection:
Kyorene Graphene fiber keeps full properties under the light but will also protect effectively against UV-A and UV-B. Kyorene fiber reaches the highest UPF (500 max) and it is ideal for outdoor work as it provides extra protection.

Graphene has a unique nitrogen atom layer in a two-dimensional crystal structure. It has huge surface area, high strength, conductivity, thermal conductivity and reflectivity. The two-dimensional structure has a high reflectivity for all kinds of light, and the shielding effect is good. The wave length of ultraviolet (UV) ranges from 100nm to 400nm. It is shorter than the visible light, longer than the X-ray electromagnetic waves, and accounts for about 6% of the solar spectrum. The effective absorption wavelength of graphene is in the range of 100nm-281nm, and the two-dimensional planar structure of graphene is more likely to reflect the ultraviolet long wavelength band (wavelength greater than 281nm), and that is how graphene composite fiber is anti-UV.

Test by Intertek AATCC 183-2010, AATCC 183-2014
2- Far infrared:
Graphene absorbs the wave length which regulates body temperature. Far infrared is recognized for medical treatment as well as home equipment like home infrared spa as it improves blood circulation and as a regulator for the body.

Test by CNAS GB/T 30127-2013

3- Anti-static:
There are chemical solutions available to make a fabric anti-static, but they do not last and are washed away easily. Additionally, they are also very harmful to the body and the environment. Metallic fiber just like Copper or Silver will have anti-static properties, but again they are harmful to the environment (recycling issue) and are also expensive. Kyorene Graphene fibers have inherent anti-static properties. Anti-static properties add a real comfort level to hand and body protection especially during the winter season when the air gets dry and the garments get electrically charged much easier.

Test by Satra according to EN16350

4- Mechanical strength such as abrasion resistance:
With our Kyorene Graphene based fiber we have been able to exceed 20000+ cycles according to the EN388 on a Martindale machine.

Test by CTC according EN 388

5- Anti-bacterial properties:
There are already many solutions on the market but most of them are through chemical treatment and they are not permanent. They will be washed away easily in home or industrial cleaning process and they are also harmful to the environment. The new REACH regulation in Europe is phasing out most of these antibacterial treatments used on gloves today. On the contrary, our Kyorene Graphene fibers have inherent antibacterial properties. Our Kyorene Graphene oxide is polymerized inside the Nylon or Polyester fiber and “makes just one”. There is also no harm to the environment or to the skin. This explains why we also meet the FDA regulation for safety gloves using Kyorene Graphene. Of course silver fibers have also inherent antibacterial properties but silver is gradually phased out in Europe for garments because of the recycling issue. In addition, silver fiber is quite brittle and easy to break in small pieces after several washing cycles which makes it uncomfortable and itchy. Silver is very expensive too.

Bacteria, fungi or mites adhere to the graphene composite fiber fabric, graphene sharp boundary “nano knife” can cut the cell membrane, causing superoxide ion-mediated oxidative stress, eventually leading to bacterial death. The surface of graphene is neither hydrophilic nor lipophilic. The surface charge and surface energy of the graphene can inhibit the growth of bacteria and mites, and destroy the cell membrane structure by adhering to the bacteria. At the same time, graphene destroys bacterial cell membrane not only by cutting the role, but also by large-scale direct extraction of cell membrane phospholipid molecules.

Test By TUV & Intertek according to ASTM E 2149-13a & GB/T20955.3-2008

6- Anti-mites:
Same idea as the above. Kyorene Graphene fiber has inherent anti-mite properties that chemical treated solutions do not have.

Test by TUV & Intertek according to GB/T24253-2009

7- Cut resistance:
With a proper Graphene composite fiber blend, we have developed a range of the cut resistant gloves ranging from ANSI A1 to ANSI A7.

Test by CTC according to EN 388 & ANSI

8- Deodorant:
Another property found with graphene material is that it balances the acidity of body sweat, thus neutralizing odor associated with sweat.

Test By Boken according to ISO 17299

How many people are still working with bare hands because wearing gloves is just not comfortable? What if there are gloves available today that protects your hands for all kinds of jobs and feels like a second skin? What if the gloves provide protection against all the properties tested for above? Join the revolution and see what the future is all about. Kyorene, the glove that redefines the glove.

By Lynn Sha Deligny
Owner of Armor Guys / QS Safety

ARMOR GUYS INC.