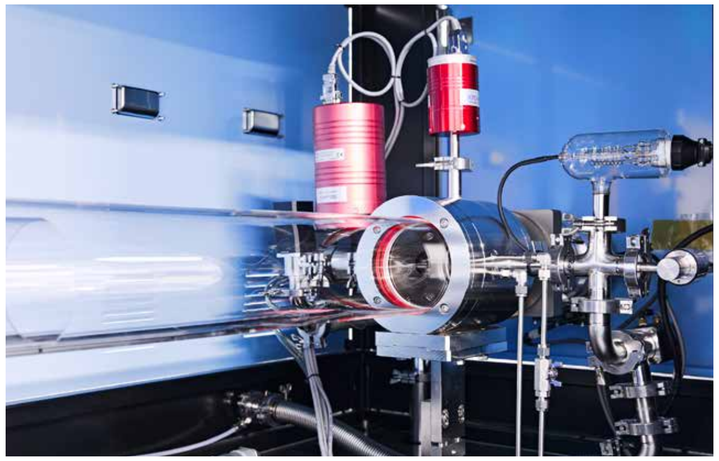
Vollebak Graphene Jacket

Vollebak, a pioneering clothing company, integrated graphene into their designs, creating the world's first graphene jacket in 2018 with heat-regulating properties. Collaborating with the National Graphene Institute, they are developing the Thermal Camouflage Jacket, a computer-programmable piece for infrared invisibility. The University of Manchester continues to lead graphene research.



Graphene

Graphene, derived from graphite, consists of pure carbon, a fundamental element found abundantly in nature and commonly used in everyday items such as pencil lead. Noteworthy for its durability, flexibility, lightweight nature, and exceptional strength, graphene is a remarkable material with diverse applications. While it's invisible to the human eye and only a single atom thick, graphene is the lightest, strongest, most conductive material ever discovered. The existence of graphene as a supermaterial was first hypothesised in the 1940s, but it wasn't until 2004 that two scientists at the University of Manchester were able to isolate and test it. Andre Geim and Konstantin Novoselov won the Nobel Prize in 2010 for their research in this area.

Vollebak

Vollebak is a clothing company known for its innovative and high-performance apparel designs. Founded by twin brothers Steve and Nick Tidball in 2015, Vollebak aims to create cutting-edge clothing using advanced technologies and materials. The company often incorporates sustainable and futuristic elements into their products. They saw an opportunity with graphene and began the journey to incorporate it into their clothing as one of their fashion lines.

Graphene Jacket

In 2018 Vollebak introduced the first Graphene Jacket V1, which was fully reversible, with one side coated in graphene and the other in robust nylon.

The latest iteration released in 2034 is made from 100% polyamide with graphene-coated polyurethane membrane. The graphene sits at the core of the jacket where it can store and redistribute heat, help regulate temperature, and reduce humidity next to the human body. It's also highly breathable, waterproof, and thanks to the graphene nanoplatelets only being a few atoms thick, weighs just 197 grams.

Thermal Camouflage Jacket

Vollebak additionally worked with the National Graphene Institute at the University of Manchester to create the Thermal Camouflage Jacket to bring us one step closer to an invisibility cloak. This innovative jacket, although still in development, marks a significant leap in wearable thermal camouflage technology.

Featuring 42 graphene patches on the front, individually controlled like pixels, the Thermal Camouflage Jacket is the first computer-programmable jacket. Each patch comprises hundreds of atom-thick layers of graphene, effectively managing thermal radiation without altering the jacket's temperature. This breakthrough enables the jacket to blend into its surroundings and appear invisible to infrared cameras.

The jacket's unique capability was demonstrated by coding it to play Tetris in infrared, showcasing precise control over thermal radiation. By applying voltage to each graphene patch, ions are manipulated between the layers, controlling thermal radiation emission and altering the jacket's appearance on infrared cameras.

While the Thermal Camouflage Jacket currently operates on the infrared spectrum, the goal is to eventually create a version that works simultaneously on the visible spectrum. Graphene's nature makes it possible to change its appearance on both spectrums by applying energy, offering exciting possibilities for invisibility technology.

The future

The road ahead involves scaling up the technology and reducing the size of graphene pixels, allowing for broader applications. The potential includes individuals blending into forests.

Graphene's unique properties make it a promising material for achieving invisibility on both the visible and infrared spectrums. As charge density is altered, the colour we perceive can change, opening the door to the development of a genuine invisibility cloak.

The journey toward invisibility technology involves overcoming interdisciplinary challenges at the intersection of physics, optical materials, electronic control systems, textiles, and engineering. The ultimate goal is to create an advanced optical device that serves as wearable clothing, a testament to the ongoing pursuit of groundbreaking innovations by the team at the University of Manchester.

University of Manchester

Today, the University of Manchester is at the forefront of graphene research, housing the National Graphene Institute and the Graphene Engineering and Innovation Centre. The University of Manchester has over 300 people working on graphene and related 2D materials research, with over 30 academic groups working across a wide breadth of subjects and disciplines - from Physics and Material Science to Chemistry and Biomedicine.

For more information, visit
www.vollebak.com @vollebak

Links

Vollebak: vollebak.com/pages/about-us

Graphene Jacket: vollebak.com/products/graphene-jacket-1?variant=40587082793049

University of Manchester: www.graphene.manchester.ac.uk/research/

Thermal Camouflage Jacket: vollebak.com/pages/thermal