

## Graphene Keeps People Warm in Open Air at Beijing 2022



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While watching victory ceremonies in Beijing's Yanqing and Chongli, Zhangjiakou at Beijing 2022, one may wonder how the volunteers in thin uniforms endured freezing temperatures in these mountainous areas.

Temperatures at these areas could drop well below zero but high-tech materials are able to keep volunteers warm even in thin layers.

"Our clothes might seem thin and light, but the inbuilt heating device can keep us warm outdoors for at least half an hour. When I feel a little cold, I can press the button on the waistcoat inside and get comfortable in about 30 seconds," said Hong Yuyao, a ritual volunteer at the Zhangjiakou competition zone.

"Serving in Beijing 2022, Graphene is a new type of nano-material featuring high electrothermal conversion efficiency of over 90 percent. Its favorable thinness, toughness, electrical and thermal conductivity help guarantee warmth in low-temperature conditions," said Chen Lijun, a designer of the graphene waistcoat.

The waistcoat for Beijing 2022 was the second-generation clothes developed by the Beijing Institute of Graphene and Technology (BIGT). "There is a card-sized power bank in the waistcoat pocket. The second-generation fabrics are softer and more comfortable," said BIGT deputy director Wang Gang.

With graphene-embedded clothes, seats, and carpets, audiences felt cozy at the closing ceremony of the Beijing Winter Olympics on February 20 when the temperature dropped to minus seven degrees Celsius. The adjustable seats in Bird Nest can be switched among 30,

37, and 47 degrees Celsius modes, and the carpet could keep its surface temperature about 20 degrees Celsius through the intelligent graphene control system.

During the Games, electronic devices including the interphone, mobile phone, and camera were also coated with graphene to remain functioning at low temperatures.

"For example, the portable broadcasting units featuring graphene materials can have a temperature rise of up to 50 degrees Celsius in a short time to function normally even at 20 below zero," Chen said.

The graphene fabrics which proved their effectiveness during the Games will also be applied to automotive thermal management systems and medical devices to further extend the technological outcomes of Beijing 2022.

Read the [original article](#) on Shanghai Daily.