Heating Polymer Fibers with Graphene Nanotubes

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A flexible ultra-fine heating fiber with graphene nanotubes has developed. Polymer fibers with graphene nanotubes combine the flexibility of synthetic fiber with very high electrical conductivity. The nanotubes can be added into melted polypropylene or polyamide to provide electrical conductivity.

From the warming of seating to the heating of industrial and living areas, from the heating of cars interior parts to the de-icing of roofs—all these challenges require flexible heating elements that allow temperature control. AMPERETEX has developed an ultrafine polymer fiber with OCSiAl's TUBALL graphene nanotubes, also known as single wall carbon nanotubes. "A current equivalent to an ordinary incandescent lamp with a power of 75 W is enough to heat polymer material with a mesh made from such a fiber with nanotubes. The solution is safe for people—the voltage of clothing made of fabric with nanotubes is only 5 V," said Pavel Pogrebnyakov, Founder and CEO of AMPERETEX.

"Graphene nanotubes are one of the highest performing conductors on Earth. At the same time, unlike other carbon additives, they are very flexible. Their shape is similar to human hair, but 50,000 times thinner. Due to their unique properties, the dosage of graphene nanotubes required to modify polymer fibers can be so low that it doesn't affect filament production or characteristics," said Dr. Christian Maus, Development and Support Leader for Thermoplastics at OCSiAl Group. The graphene nanotubes are available as concentrates that can be added into melted polypropylene or polyamide, for example.

Heating mesh made of the innovative fibers is integrated into flexible material or complex-shaped composite elements. Laboratory tests showed a fiber durability of 30,000 cycles, which is compatible to a 30-year service life. Electrically conductive heating meshes have successfully passed testing in various projects, among which are an anti-icing roof and a bus stop: an anti-slip coating with integrated AMPERETEX heating elements and embedded automatic heating sensors.

“The market for the application of such fibers is huge. This includes the medical, agricultural, construction, oil and gas, automotive, and aerospace industries. Currently, we have entered production of synthetic heating fabrics at industrial-scale volumes. This year, we plan to release a line of products for heating in previously unavailable areas. We are trying to reduce energy consumption and create solutions for the B2B sector in response to a specific request. The next step is the usage of these elements for heating of hard-to-reach objects and products with complex geometric configurations,” noted Pavel Pogrebnyakov.

Read the original article on Industry Today.