Nanocellulose-based Aerogel Fibers as Insulation
Tech ID: 32428 / UC Case 2020-030-0

ABSTRACT
Researchers at the University of California, Davis have produced continuous, sheath-core, coaxial fibers with highly porous, nanocellulose, aerogel cores for use as high-performance insulators.

FULL DESCRIPTION
Aerogels are high-porosity, ultralight, materials that are 99+% air. Their properties include uncommon traits that allow aerogels to fulfill unique applications. For example, incorporating three-dimensional (3-D) aerogels into fibers produces clothing with properties that include protection against both extreme hot and cold. Currently, such aerogel fibers are produced using both dissolution and coagulation processes. However, dissolution and coagulation are time-consuming and chemically-intensive. Moreover, current aerogel fabrication processes struggle to produce continuous fibers consistently while also maintaining aerogel-like density and porosity. Thus, there is a need for an improved process that can create continuous, aerogel-like, fibers.

Researchers at the University of California, Davis have developed a method for producing continuous fibers with highly porous aerogel cores. This technology combines cellulose - which is among the least thermally conductive materials - with highly porous aerogel structures in order to maximize the thermal insulation potential of the fibers. Moreover, the sheath component functions as a template and as a surface layer to protect the integrity of the aerogel structure from external forces or the environment. Thus, this method yields continuous fibers while maintaining internal aerogel structures. These fibers can potentially be used for various insulation devices, wearables, and other platform technologies with multiple, commercial scale, applications.

APPLICATIONS
▶ Widespread thermal protection and insulation material applications

FEATURES/BENEFITS
▶ Provides thermal insulation in ambient temperatures ranging from -20 to 150°C
▶ Produces fibers strong enough for weaving, knitting, and other textile applications
▶ Can create fibers of variable diameters
▶ Is scalable
▶ Applicable to various, energy-saving, solutions

PATENT STATUS
Patent Pending

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OTHER INFORMATION
KEYWORDS
Nanocellulose, Aerogel, Insulation, High porosity, Fiber, Thermal conductivity, Clothing technologies, Energy-efficient

CATEGORIZED AS
▶ Energy
▶ Other
▶ Materials & Chemicals
▶ Nanomaterials
▶ Textiles
▶ Nanotechnology
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▶ NanoBio
▶ Engineering
▶ Other

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