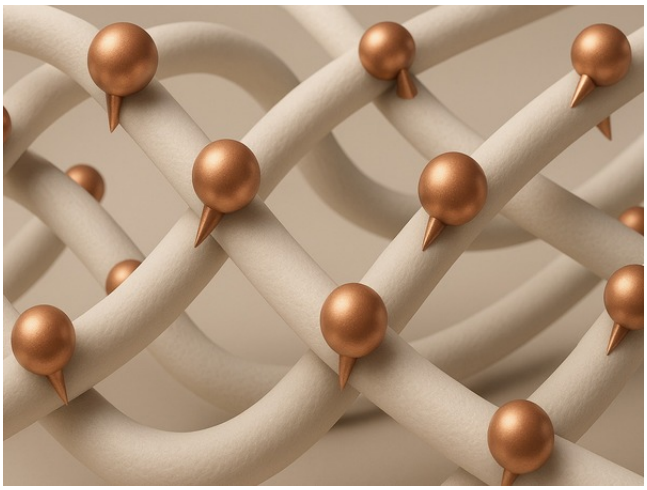
PURDUE INNOVATES | Office of Technology Commercialization

Nanoparticle Deposition on Polymeric Fibers for Antimicrobial Filter Application

Durable copper nanoparticle deposition on polymers creates antimicrobial filters for masks, HVAC, and food processing.



Researchers at Purdue University have developed a new method for nanoparticle deposition on polymeric fibers for antimicrobial filter applications. Challenges often arise in combing metallic nanoparticles with soft polymers because of poor adhesion between the two materials and dislodging of particles upon contact with a fluid medium, such as water for washing. Purdue researchers have fine-tuned a new nucleation process for creating truncated copper nanoparticles to enhance mechanical and adhesive properties on fibers of nonwoven polymer materials. The fibers were tensile tested with applied strain at 7%, 11%, and 14% and analyzed using Raman spectroscopy, showing some signs of necking past 11% strain. Adhesion energy between copper nanoparticles and polymer fibers was evaluated through a Gibbs-Wulff-Kaischew simulation having first order approximation 1 J/m^2 and lower bound 0.48 J/m^2, showing that the new materials have high degree of durability. The new materials can be woven into a mat form such as for facemasks, food processing, air filters in HVAC systems, and more.

Advantages:

Technology ID

2021-BAHR-69228

Category

Chemicals & Advanced Materials/Coatings, Adhesives & Sealants

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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View online

-Antimicrobial

-Improved Adhesion Between Metal Nanoparticles and Polymeric Fibers

-Scale-Up

Potential Applications:

-Facemasks

-Materials Science

Recent Publication:

"Well-Adhered Copper Nanotubes on Electrospun Polymeric Fibers"

Journal of Nanomaterials

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TRL: 3

Intellectual Property:

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