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Highly Dense and Uniform Copper Nanowires Fabrication for Enhanced Multilayered Thermal Interface Material Application.

Flexible, conductive copper nanowire membranes improving thermal management in electronics and data centers.

Thermal management is a primary challenge in the semiconductor industry, as both data centers and consumer electronics consume more power to offer greater performance to users. Thermal interface materials (TIM) conduct heat away from the chips and towards cooling systems that can dissipate the heat away from the electronics. Researchers at Purdue University have developed a method for the fabrication of dense and uniform copper nanowires that have application in the development of state-of-the-art TIMs. The fabricated structures are flexible and highly conductive, minimizing thermal resistance. This technology would be beneficial to companies or organizations looking to develop advanced thermal interfaces or looking to improve performance of electronic systems via improved cooling capabilities.

Advantages

-Improved heat transfer for thermal interfaces

-Flexible

-Superior cooling for electronics

Applications

-Heat Transfer

-Thermal Management

-Semiconductor packaging

-Data Centers

Technology ID
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Category
Semiconductors/Thermal Management & Cooling Technologies

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-Consumer Electronics

Technology Validation:

This technology has been validated through fabrication of samples of the copper nanowire membrane.

TRL: 2

Intellectual Property:

Provisional-Patent, 2024-05-24, United States

Utility Patent, 2025-05-22, United States

Keywords: Thermal interface materials,Advanced heat dissipation,Copper nanowire cooling,Flexible thermal solutions,Semiconductor thermal management,High-performance electronics cooling,Data center thermal optimization,Electronic system cooling,Nanomaterials for heat transfer,Microelectronics cooling technology,Thermal conductivity enhancement,Consumer electronics cooling,Semiconductor packaging solutions,Materials for thermal management