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A thermal switch and regulator device based on graphene foams

Compressible graphene foams provide tunable, reliable heat control for EVs, batteries, and energy storage.

Researchers at Purdue University have developed a new thermal switch and regulator device for energy applications including battery technologies, electric vehicles, energy storage devices, and space conditioning systems. Current thermal switch technology is often limited to the ability to turn thermal conductance either on or off, inhibiting performance thermal devices, especially in inclement weather conditions. Purdue researchers have fine-tuned a graphene-based switch for more reliable thermal management. In testing at 85% applied strain, the new switch exhibited thermal conductance at a ratio of 8.09 between fully compressed and uncompressed settings, heat flux of 3 kW/m2, and adjustable temperature window of ~10 Â°C. This efficient approach can allow for optimal thermal control even in harsh environments.

Advantages:

-Reliable

-Improved thermal management

Potential Applications:

-Batteries

-Vehicles

-Energy storage

-Space conditioning

Related Publications:

Du, T., Xiong, Z., Delgado, L. et al. Wide range continuously tunable and fast thermal switching based on compressible graphene composite foams. Nat

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Category

Energy & Power Systems/Energy Storage

Materials Science & Nanotechnology/Nanomaterials & Nanostructures

Materials Science & Nanotechnology/Thermal Management Materials & Solutions

Further information

Will Buchanan

wdbuchanan@prf.org

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Zixin Xiong, Amy Marconnet, and Xiulin Ruan. ACS Applied Materials & Interfaces 2022 14 (43), 48960-48966. DOI: 10.1021/acsami.2c10880

https://www.purdue.edu/newsroom/2024/Q3/new-research-focuses-on-keeping-todays-hottest-electronics-cool-for-users-at-nanoscale-level/

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Provisional-Patent, 2020-09-25, United States

Utility Patent, 2021-09-27, United States

DIV-Patent, 2024-10-31, United States

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