

## Evaporation Enhanced Heat Sink and Condensation Unit (#4282, 4362)

A hybrid heat sink featuring a droplet-generating microarray for a significant enhancement of heat sink performance

Georgia Tech inventors have created a hybrid thermal management device, which enables significant enhancement of conventional air-cooled heat sinks, which are passive heat exchangers that increase the surface area of high-heat devices to help with heat dissipation. The key innovation is a cover plate design that can be integrated with traditional heat sink designs. It generates fluid droplets that drastically increase a heat sink's effectiveness by acting similarly to sweat on the human body.

In addition to the cover plate, inventors have also incorporated an active vapor condensation method that captures and reuses the fluid used in the heat sink by using semi-permeable membranes and a phase separation structure. This creates a water cycle like effect and significantly adds to a heat sink's performance by removing high thermal loads.

### Benefits/Advantages

- **High degree of integration** - system compactness for miniaturization
- **Heat reduction** - removal of very high temperature fluxes, or moderate heat fluxes over large domains
- **Low power operation**
- **Simplicity of design**
- **Compatibility** - can be integrated with existing technologies

### Potential Commercial Applications

- Electronics
- Localized removal of high thermal loads
- Handling thermal loads generated by multiple devices

### Background/Context for This Invention

A well-recognized problem currently affecting electronic devices is the issue of overheating, which causes

performance issues and reduces the reliability of chips. This is especially a problem with microelectronics, due to their heat output and smaller surface area. Removing the heat resulting from the operations of electronic devices is recognized as a “bottleneck” for chip manufacturers, as technology can only progress so far until the problem is addressed.

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## **Patent/IP Information**

**U.S. Patent Issued**

[US9945617B2](#)

<https://patents.google.com/patent/US9945617B2/en?q=US%209%2C945%2C617>

## **Patent/IP Information**

**U.S. Patent Issued**

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## **Publications**

**For more information about this technology, please visit:**

<https://licensing.research.gatech.edu/technology/evaporation-enhanced-heat-sink-and-condensation-unit>