

Study finds faster, cheaper way to cool electronic devices

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A North Carolina State University researcher has developed a more efficient, less expensive way of cooling electronic devices – particularly devices that generate a lot of heat, such as lasers and power devices.

The technique uses a "heat spreader" made of a copper-graphene [composite](#), which is attached to the electronic device using an indium-graphene interface film "Both the copper-graphene and indium-graphene have higher thermal conductivity, allowing the device to cool efficiently," says Dr. Jag Kasichainula, an associate professor of materials science and engineering at NC State and author of a paper on the research. Thermal conductivity is the rate at which a material conducts heat.

In fact, Kasichainula found that the copper-graphene film's [thermal conductivity](#) allows it to cool approximately 25 percent faster than pure copper, which is what most devices currently use.

Dissipating heat from [electronic devices](#) is important, because the devices become unreliable when they become too hot.

The paper also lays out the manufacturing process for creating the copper-graphene composite, using an electrochemical deposition process. "The copper-graphene composite is also low-cost and easy to produce," Kasichainula says. "Copper is expensive, so replacing some of the [copper](#) with graphene actually lowers the overall cost."

More information: The paper, "Thermal Conductivity of Copper-Graphene Composite Films Synthesized by Electrochemical Deposition with Exfoliated Graphene Platelets," is published in *Metallurgical and Materials Transactions B*.

Provided by North Carolina State University

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