BEAT THE HEAT

Thermal paste helps minimize overheating in electronic devices.

A materials engineer at the University at Buffalo has invented a new thermal paste that will help solve the problem of overheating in high-performance personal computers and other electronics.

"Heat dissipation is the most critical problem in the electronics industry because it limits the performance, speed and further miniaturization of microelectronics."
— Chung

Created by Deborah D.L. Chung, Niagara Mohawk Professor of Materials Research in the UB School of Engineering and Applied Sciences, the paste, when applied between a heat sink and a heat source, can greatly improve the conduction of heat from the heat source to the heat sink. Heat sinks are widely used in electronics to draw away heat produced by the device and prevent the device from overheating.

"Heat dissipation is the most critical problem in the electronics industry because it limits the performance, speed and further miniaturization of microelectronics," Chung explains.

In comparative laser-flash testing, Chung's thermal paste – composed of carbon-filled organic material – performed better than leading thermal pastes currently on the market.

"The invented material is superior to all other thermal pastes, including those involving exotic materials such as carbon nanotubes and diamond. It even significantly surpasses solder – the best material currently available – for improving the thermal contact between two surfaces," she says.

The development of heat sink materials has received much attention for the alleviation of the overheating problem, Chung notes. Development of thermal pastes for improving the thermal contact between the heat source and the heat sink has received relatively little attention, however.

Without a good thermal paste, the use of an expensive heat sink material is not worthwhile, Chung says. "Even if the heat sink itself is very high in thermal conductivity, heat conduction from the heat source to the heat sink remains poor unless the thermal contact between heat sink and heat source is good," she says.

Additional benefits of Chung's thermal paste are that it is inexpensive to produce and it can also be used on heat pipes (for drawing out geothermal energy) and within thermal fluid heaters for reclaiming heat indirectly produced by the heaters.

Chung has filed a patent for the thermal paste working with the UB Office of Science, Technology Transfer and Economic Outreach (STOR). UB mechanical and aerospace engineering graduate student Chia-Ken Leong assisted in the development process.

Chung is director of UB's Composite Materials Research Laboratory, which conducts research on composite materials for aerospace, automotive, construction and electronic applications.

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