# Microchannel Heat Sink with Means for Local and Global Heat Transfer Enhancement Ð

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- Electrical Engineering

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- Micro & Nanoelectronics
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With the size of microelectronics ever decreasing and the power density increasing, there is a need to develop novel cooling strategies to achieve very high heat removal rates from such devices. Conventional microchannel heat sinks experience deterioration in thermal performance along their length. Hot spots of elevated temperature can develop at local regions of the heat-generating component, such as a microelectronic chip, and thus at the local regions of the microchannels. There is a need for a microchannel heat sink that provides improved overall heat transfer and localized heat transfer that can be tailored to one or more particular hot spots of a heat-generating component such as a microelectronic chip.

Purdue University researchers have developed an improved microchannel heat sink and a method to remove heat from a heat-generating component, such as a microelectronic chip. This technology provides enhancement of localized heat transfer rates to lower maximum chip temperatures in microelectronic apparatuses as well as to achieve lower temperature gradients on chips to reduce thermal stresses, improve reliability, and increase chip performance. These advantages are achieved using the one or more recesses to provide passive flow modulation with a smaller pressure drop across the microchannels with a lower pumping power. The recesses can be strategically located to achieve higher rates of cooling at desired specific locations such as proximate hot spots of the chip.

Advantages:
-Significant increase in local and overall heat removal
-Can target hot spots
-Reduced thermal stresses
-Improved reliability
-Increased chip performance

Potential Applications:
-Electronics manufacturers

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**Intellectual Property:**

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