Nanostructured Thin Film TEG™ Harvests and Converts Waste Heat Into Electricity

Nextreme's miniature thin film TEG™ enables recycling of heat to electricity…

Research Triangle Park, N.C. (August 15, 2007) – Nextreme has developed a miniature, thin film thermoelectric generator (TEG™) that converts heat directly into electricity. Ideal for waste heat conversion applications, the solid state TEG delivers power generation densities (>3W/cm^2) in excess of those achieved using bulk materials and is optimized to provide power in a form factor that can be as much as 20x thinner than bulk material alternatives. This opens up waste heat energy conversion applications for the Nextreme technology as well as remote power applications. Manufactured using semiconductor fabrication techniques, the TEG is scalable, cost-effective, and can be utilized in a broad range of markets and applications including automotive, military and aerospace, thermal batteries, medical implants and wireless sensor networks.

"In environments where a lot of heat is available we have demonstrated power levels of up to 300 mW with devices that are not much bigger than a piece of confetti," said Dr. Seri Lee, Nextreme Chief Technology Officer. "And in low grade thermal environments, we have demonstrated micro-watts of power – enough thermal energy conversion to power remote sensors and other distributed devices."

Nextreme's TEG has demonstrated output power levels of >100mW at ΔT of 70°K and >300mW at ΔT of 120°K. With modules measuring just 3.5mm x 3.5mm, the TEG has corresponding output power densities of ~ 1 – 3W/cm^2.

Nextreme's TEG devices generate electricity via the Seebeck Effect, where electricity is produced from a temperature differential applied across the device. The temperature difference (ΔT) between the hot (T_h) and the cold (T_c) sources leads to a difference in the Fermi energy (ΔE_F) across the thermoelectric material yielding a potential difference, which drives a current.

For more information, or to request a TEG prototype, contact Nextreme at 3040 Cornwallis Road, P.O. Box 13981, Research Triangle Park, NC 27709-3981; call (919) 990-8300; e-mail info@nextreme.com; or go to www.nextreme.com.

About Nextreme

Nextreme manufactures thin film thermoelectric components that address most challenging thermal management and power generation needs of the semiconductor, photonics, consumer, and defense/aerospace industries. Nextreme's miniature, thin film eTEC offers an industry first — a micro-refrigerator the size of a piece of confetti that enables solid state temperature control or power generation on a micro-scale, in close proximity to the source. eTECs operate as point-specific heat pumps for rapid cooling or heating of semiconductors and other electronics; for thermal management of fiber-optic laser controls integrated optoelectronics; or for power generation by converting otherwise wasted heat into useful electricity.

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