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COOLING FILM TEMPERS TINY HOT SPOTS

By Peter Weiss

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Heat-disposing dots of new, highly efficient thermoelectric materials spell out letters in cool blue in this infrared image.

Venkatasubramanian *et al.*/*Nature*

Thermoelectric coolers were expected to render ordinary mechanical refrigerators obsolete, but these semiconductor-based gadgets remain costly bit players in refrigeration. While the electric-powered devices today chill such items as space-borne sensors, plug-in beverage coolers, and luxury car seats, scientific progress on the materials underlying the devices hasn't moved much since the 1960s (SN: 9/6/97, p. 152: http://www.sciencenews.org/sn_arc97/9_6_97/bob1.htm).

The big chill in thermoelectric research may be thawing. Rama Venkatasubramanian and his colleagues at the Research Triangle Institute in Research Triangle Park, N.C., have started stacking semiconductor compounds in layers, each only a few atoms thick. Thermoelectric materials made this way are 2♦ times as efficient as the alloys used in current devices.

Since these semiconductor sandwiches are less than one-hundredth the thickness of current components, the novel devices need not pump heat very far. Consequently, they remove heat♦or add it when the electric current is reversed♦23,000 times as fast as today's thermoelectric components do, the researchers report in the Oct. 11 *Nature*. A flea-size device using the new film can conduct heat as effectively as a much thicker, postage-stamp-size slab of today's materials.

The new film could be useful for cooling dense, hot-running electronic and optical microchips and for controlling temperatures of DNA and protein biochips (SN: 3/8/97, p. 144), Venkatasubramanian says. The new devices might also be able to convert waste heat in car engines into usable electric current.

Although not yet cheap or efficient enough to take the place of the kitchen fridge, the new layered film is "a major step towards more widespread use of

thermoelectric technology," says Cronin B. Vining of ZT Services in Auburn, Ala., in a commentary that accompanies the report.