Chip cooling technology struck by lightning

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The days of noisy fan-cooled laptops and PCs could be numbered, with tiny lightning storms set to take the heat in the cooling process.

Finding new ways to dissipate the heat chips generate is one of the major challenges facing system designers. Water is a more efficient coolant than air, but has some rather obvious drawbacks.

Now, a team at Purdue University in Indiana, funded by the US National Science Foundation, has developed an air-based technique that, at 40W/cm2 has a cooling rate comparable to that of water.

In an interview with *New Scientist*, the researchers explain that the key to improving the cooling rate was to create an air flow right next to the wall of the heat sink, rather than relying on a fan to blow air onto the surface.

The technology they have developed uses oppositely-charged electrodes sporting bristles of carbon nanotubes. These are positioned on either side of the heat sink wall, and switching on the voltage causes a transfer of electrons which positively ionise the air molecules.

This is the same principle by which lightning is formed, but in this case doesn’t produce any sparks. Phew.

Once ionised, the molecules will flow across the surface of the heat sink from the positive to negative electrode, cooling the surface. Cycling the electrodes' voltage creates a constant flow of molecules.

Suresh Garimella, who led the research and is a bit of a chip-cooling guru, has a word of caution: the team doesn't know how efficiently the voltage produces electrons. Unused voltage will be converted to heat, which is a bit of a problem in a cooling system.

However, the team has managed to use the system to cool metal, and is confident it could be built into a chip. Sort of brings new meaning to the phrase "a storm in a teacup", doesn't it? ®