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Is Cracked Silicon the Future for Chips?

By Michael Kanellos

Cracks are a bad thing in general, but they might help speed up chips.

[AmberWave Systems](#), which specializes in semiconductor substructures, discussed a new method for growing germanium and other, faster semiconductor materials on top of silicon at the recent [Semicon West conference](#), according to the [Technology Review](#) magazine of the Massachusetts Institute of Technology.

In a nutshell, AmberWave digs trenches of about 500 nanometers deep in silicon. The trenches are then filled with germanium. This causes the silicon to crack, but the cracks go up only about half of the height of the trench wall. Regular germanium can be grown on top of it. Thus, you could have an relatively cheap industry-standard substrate (silicon) topped with speedier germanium transistors. Other materials, such as indium, might work too.

AmberWave has been around for a while trying to mix germanium and silicon. It was one of the pioneers in [strained silicon](#), which involves stretching the silicon lattice with germanium. Stretching the lattice enables the electrons to move faster and hence increase performance. Years ago, researchers dismissed strained silicon as [crazy talk](#). Now nearly every major chipmaker puts it in its chips.

The technology didn't work perfectly, and some of the technology collaborations the company entered were terminated. But it did get Intel to sign a licensing deal.

Like a lot of chip companies, AmberWave doesn't make chips. Instead, it licenses technology to chipmakers. Naturally, that means that the company has to sue people to gain compensation--large manufacturers rarely sign licensing deals until a small company has beat a larger one in court or at least has gotten a huge settlement. (Contrary to popular sentiment, it takes a lot of effort to get money off a patent portfolio.) I once asked Mark Wolf, AmberWave's former CEO, about the Rambus-Infineon trial. [He rooted for Rambus](#).

"It's our O.J. (Simpson) trial," he said.

AmberWave has also dipped into silicon photonics, which involves swapping out copper wire in chips and replacing it with fiber optics.