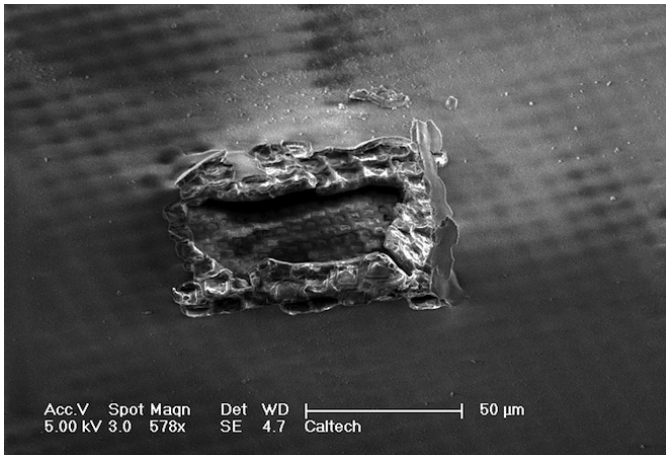


A Step Towards Indestructible Circuits

Written by Marco Attard
20 March 2013

Researchers at the California Institute of Technology (Caltech) believe they have the secret to more robust, "self-healing" processors-- building chips able to keep on working even after laser blasts.



The failure of a single transistor often renders most chips out of service. Not with the Caltech chips. The prototypes (power amplifiers of the mobile phones kind) carry a number of robust sensors measuring temperature, current, voltage and power while feeding into an application-specific integrated-circuit (ASIC) unit.

The ASIC unit measures chip performance and adjusts system actuators (the changeable parts of the chip) by drawing conclusions based on aggregate response from the sensors.

"You tell the chip the results you want and let it figure out how to produce those results," team member Steven Bowers says. "The challenge is that there are more than 100000 transistors on each chip. We don't know all of the different things that might go wrong, and we don't need to. We have designed the system in a general enough way that it finds the optimum state for all of the actuators in any situation without external intervention."

To test out the technology the Caltech team shot out small areas of the chips using different sizes of high-power laser, with damage running from vaporising the top layer of the chip to deeper, more powerful shots. The self-healing results not only work well, but also can be extended to any kind of electronic system.

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The researchers now hope chipmakers will start making use of the technology, creating the more robust processors and boosted chip yield rates of the future.

Go [Creating Indestructible Self-healing Circuits](#)