

Search the site

Advanced Search...

**Click here to clear  
your storeroom**

**www.e4overstock.com**

For engineers and industry

**>> Home**

[e4engineering.com](#)

[Events](#)

**>> Contents**

[Latest news](#)

[Analysis](#)

[Comment](#)

[Features](#)



**>> Channels**

[Aerospace](#)

[Automotive](#)

[Business & Finance](#)

[Chemical & Process](#)

[Civil Engineering](#)

[Communications](#)

[Computers & IT](#)

[Controls](#)

[Electrical & Electronics](#)

[Environmental](#)

[Health & Safety](#)

[Machinery & Equipment](#)

[Mechanical](#)

[Medical](#)

[Recruitment](#)

**>> News**

**From E4 : Engineering**, 03 January 2002, in **Electrical & Electronics**

## Silicon on sapphire technology leads to speedier chips

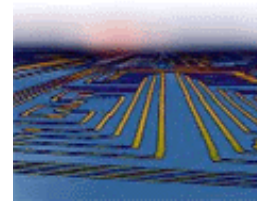
Using light beams in place of metal wires, engineers at Johns Hopkins University in the US have devised a cost-effective method to speed up the way microchips 'talk' to each other.

The method, created by a team in the Department of Electrical and Computer Engineering, is said to take advantage of unusual characteristics associated with 'silicon on sapphire' technology, a new way to manufacture microchips.

'We've developed a very fast and cost-effective way of getting data on and off a chip without using wire,' said Andreas G. Andreou, a professor in the department and director of the lab in which the work was done. 'It really promises to revolutionise how computer systems for homes and businesses are put together.'

Andreou's team relies on the same fibre optics technology that is used to carry phone conversations across great distances. These components are incorporated into a new type of microchip technology. The microchips inside most modern computers are assembled on thin slices of silicon, a material that is a semiconductor. The Johns Hopkins engineers use microchips in which silicon is layered onto thin slices of synthetic sapphire, a material that is an insulator and also allows light to pass through it.

In the microsystem devised by Andreou's team, a signal that originates in a wire is transformed into light and beamed through the transparent sapphire substrate through a laser that is only slightly larger than a human hair. Microlenses and other optical components, manufactured at the same time as the electronic circuits on the microchip, collect the light beam and guide it to another place on the microchip or, using an optical fibre, move it to another chip.



**>> On the Web**

[John Hopkins University](#)

**>> Home news**

[Bug may help clean up PCB deposits](#)

[Now there is just one step to phenol](#)

[BP and ChevronTexaco to build \\$23 million wind farm](#)

[Network aims to help firms exploit online opportunities](#)

[Northrop Grumman awarded \\$70 million contract](#)

**>> Related Channels**

[Electrical & Electronics](#)

**The E4 Network <<**

[e4engineering.com](#)

[e4businessbanking.com](#)

[e4data.com](#)

[e4enquiry.com](#)

[e4jobnet.com](#)

[e4metals.com](#)

[e4overstock.com](#)

[e4production.net](#)

[e4subcontracting.com](#)



**Magazines <<**

[Media Information](#)

[The Engineer](#)

[Design Engineering](#)

[Process Engineering](#)

[Metalworking Production](#)

[Control & Instrumentation](#)

[Integrated Manufacturing Solutions](#)

[What's New In Industry](#)

[Subscribe](#)

**Events <<**

[Subcon 2002](#)

>> **FAQ**

[About E4](#)

[Technical Info](#)

[Who's Who](#)

[Privacy Policy](#)

At its destination, the light enters a high-speed optical receiver circuit that transforms the stream of photons into a stream of electrons that continue their journey through electrical wiring connected to other computer components.

By using optical signals, or simply an unhindered laser beam, the Johns Hopkins researchers believe a signal could move 100 times faster than it does along a metal wire. Also, the optoelectric interface circuits require much less power because the sapphire substrate is an insulating material, not a semiconductor.

This property of the substrate is said to reduce the power dissipation that commonly occurs in modern microprocessors when signals travel through wires that have capacitances, which are parasitic components that not only degrade the signals but also increase the power consumption of the system.

'Without the parasitic capacitances, it's much faster to send signals at the speed of light,' said Alyssa Apsel, a doctoral student in the Anderou lab who helped developed the system.



[Subscribe online now!](#)

Copyright Centaur Communications Ltd. All rights reserved.  
Read our [privacy policy](#). Technical queries to [e4@centaurnet.co.uk](mailto:e4@centaurnet.co.uk).  
Other queries to [arvidj@centaur.co.uk](mailto:arvidj@centaur.co.uk).

The **e4** Network