Optical Modulator with Plasmon-based Coupling for high-speed on-chip optical interconnects

- Optical modulation based on a surface plasmon effect
- Operates on bulk silicon
- Fully CMOS compatible
- Potentially very high modulation speeds
The Technology Opportunity

The field of Silicon Photonics has developed in order to provide optical interconnects that are faster and more efficient than their electrical counterparts. Much progress has been made but such optical inter- and intra- chip interconnects are still out of reach. Surprisingly, material incompatibility is the key issue. While silicon is a favourite of both photonics and electronics, photonics also requires a lower cladding for its waveguides. This takes the form of the thick oxide layer of a Silicon-on-Insulator (SOI) wafer. As such a layer would trap heat in the transistors, reducing the integration density, this is unacceptable to the electronics industry.

Wavelength-coupled light to a Surface Plasmon

Our invention uses surface plasmon modes to guide light using a single interface between a metal and a dielectric. We exploit the phenomenon of extraordinary sensitivity to realise a low loss, low power consumption optical modulator based on the high speed (40GHz+) free carrier dispersion effect. Using surface plasmon modes to guide light in this way avoids the need for the problematic lower cladding layer and permits front-end integration with minimal changes to electrical device manufacturing processes currently in use.

Application areas

The front-end integration of electronics and photonics will enable the next generation of computer systems providing cheap and effective on- and off- chip communications.

IPR Protection

Stemming from UK patent application 1313592.6, the patented technology concept is filed as International patent application PCT/GB2014/051844 and published as (WO2015/015148, 5 February 2015).

What to do next

There are no commercial parties involved in this research and the University of St Andrews would welcome enquiries from third parties interested in developing commercial applications of this Optical Modulator with Plasmon-based coupling technology. The University is looking to enter a commercial partnership with a company in the area of novel optical modulation technology.

If you would like to explore this technology transfer opportunity in more detail, please contact:

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Additional Information will be made available under a Confidentiality Agreement

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