Leti demonstrates the integration of CMOS-compatible plasmonic optical waveguides with silicon photonic devices

Medical Design Technology

CEA-Leti, a leading European research and development institute in the field of silicon photonics technology, today announced that it has demonstrated the efficient integration of silicon photonic devices with fully complementary metal-oxide semiconductor (CMOS)-compatible plasmonic optical waveguides.

This new capability sets the stage for the fabrication of smaller, faster and more efficient opto-electronic interfaces, which could ultimately allow the development of significantly higher-performance sensors, computer chips and other electronic components.

Waveguides, including optical fibers, are used to transmit signals and power in a variety of radio and optical communications uses. Leti's new devices channel light through a narrow silicon waveguide placed in close proximity to a metal waveguide, causing the light to excite small, high-frequency electromagnetic waves, known as surface plasmons, in the metallic structures. The resulting devices can convert optical signals in the 1.5 micrometers (µm) communications band into plasmonic electron waves, and convert the plasmonic waves back into optical signals.

Leti's pioneering combination of extremely small plasmonic-optical interfaces that connect to standard optical fibers provides high coupling efficiencies (up to 70 percent) over a wide spectral range. And unlike previous devices that have relied on metal waveguides made from gold, Leti's metal waveguides are fabricated with copper, allowing them to be easily integrated into standard CMOS chip manufacturing processes.

"*This demonstration of CMOS-compatible plasmonic-optical technology is a major milestone in the emerging field of metal-oxide-semiconductor photonics,*" said **Laurent Fulbert**, Photonics Programs Manager at Leti. "*By concentrating light into very small modes, we can provide an efficient optical interface between the macroscopic world of optical fibers and the nano-scale world of transistors and molecular electronic devices.*"

The plasmonic-optical devices were designed and fabricated by Leti, which collaborated with France's Université de Technologie de Troyes (UTT) for additional near-field scanning optical microscope testing and characterization. The project results were presented earlier this month at the Group Four Photonics 2010 show in Beijing, and published in Nano Letters, a journal of the American Chemical Society.

About CEA-Leti
CEA is a French research and technology public organisation, with activities in four

main areas: energy, information technologies, healthcare technologies and defence and security. Within CEA, the Laboratory for Electronics & Information Technology (CEA-Leti) works with companies in order to increase their competitiveness through technological innovation and transfers. CEA-Leti is focused on micro and nanotechnologies and their applications, from wireless devices and systems, to biology and healthcare or photonics. Nanoelectronics and microsystems (MEMS) are at the core of its activities. As a major player in MINATEC campus, CEA-Leti operates 8,000-m" state-of-the-art clean rooms, on 24/7 mode, on 200mm and 300mm wafer standards. With 1,200 employees, CEA-Leti trains more than 150 Ph.D. students and hosts 200 assignees from partner companies. Strongly committed to the creation of value for the industry, CEA-Leti puts a strong emphasis on intellectual property and owns more than 1,500 patent families.

For more information about Leti, please visit
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