Recent advances in Hybrid Plasmonic Circuits for Data Communications

(Invited paper)

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ABSTRACT

I plan to discuss a novel class of nanoscale devices that address unmet performance demands for applications in data communications [1-6]. The performance of emerging generations of high-speed, integrated electronic circuits is increasingly dictated by interconnect density and latency as well as by power consumption. To alleviate these limitations, data communications using photons has been deployed, where photonic circuits and devices are integrated on platforms compatible with conventional electronic technologies. Within the dominant platform; namely Si, dielectric waveguides confine light via total internal reflection. This imposes bounds on minimizing device dimensions and density of integration. Those bounds arise due to the diffraction limit and the cross-coupling between neighbouring waveguides. Nanoscale Plasmonic waveguides provide the unique ability to confine light within a few nanometers and allow for near perfect transmission through sharp bends as well as efficient light distribution between orthogonally intersecting junctions. With these structures as a building block, new levels of optoelectronic integration and performance metrics for athermal transceivers with achievable bandwidths in excess of 500 Gbps as will be overviewed in this talk. In addition, opportunities for the role that 2D materials may pay in propelling these record performance metrics even further will be projected.

Keywords: Plasmonics, Optical transceivers, Optical interconnects, Integration, High speed optical links.

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