14 May 2019Recent advances in (nano)photonic information processors: from devices to networks (Conference Presentation)

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Abstract

The end of Moore's law, the many challenging 'hard' problems (e.g. NP-complete), and requirements to compute-at-the-edge of the network have made the case for non van Neumann machines, possible analogue compute engines and accelerators. Here I will review our latest work on emerging photonic-enabled compute paradigms and co-processors highlighted by three topics; i) neuromorphic photonic computing, ii) a reconfigurable optical computer, iii) an photonic joint-transform correlator. The results show a processing speed-up and energy savings of multiple orders of magnitude compared to van Neumann systems indicating that the new bottleneck will be data I/O (e.g. DAC/ADC). Device novelties include a) DBR-enabled 60GHz graphene EAM, b) hybrid plasmon graphene EAM with 100aJ/bit efficiency, d) the first ITO-based MZI showing VpL=0.52V-mm, and e) plasmonic ITO MZI with a record low VpL=0.01 V-mm.