New Directions in Silicon Photonics: From Optical Communications to the Brain

Abstract:
Foundry-manufactured, monolithically integrated multilayer silicon nitride-on-silicon photonic platforms are suitable for large-scale photonic circuits. These photonic platforms contain several waveguide layers, and light is routed amongst the layers to create 3D photonic devices and circuits. We have realized a suite of devices in these platforms, including ultra-low-loss waveguide crossings, multi-layer grating couplers, and efficient modulators. We are now working on hybrid laser integration from the backside. These advancements in integrated photonics on silicon, which were initially driven by telecommunications, are leading to neurophotonic implants for brain activity mapping.