Yu longhai:

In summary, a graphene transparent flexible heat conductor that can achieve non-local heating for thermally tuning photonic integrated devices has been demonstrated for the first time. Thermally tuning MZIs and micro-disks have been realized with the present graphene transparent flexible heat conductor. For these devices, the graphene sheet partially covers the metal heater and the SOI nanowire to be heated so that the heat energy can be delivered. It has been shown that the excellent heat conductivity, transparency and flexibility of graphene make it attractive as a heat conductor for thermally tuning devices, particularly when the metal heater cannot be applied in the traditional way. The heat efficiency and the temporal response can be further improved with optimized designs and fabrication processes.

Yongbo:

In summary, 1-volt uncooled operation at 40 Gb/s has been demonstrated on a hybrid silicon modulator with a lumped configuration. 5 dB dynamic extinction ratios have been obtained for both the back-to-back transmissions and the transmissions through a 10.9 km single mode fiber at the temperatures of 20 ◦C, 40 ◦C, 60 ◦C and 80◦ C with optimized input wavelength and everse bias, respectively. The total energy consumption of the hybrid silicon modulator for this measurement is around 112.5 fJ/bit including the contribution from the photocurrent.

In summary, a hybrid silicon TW-EAM with a modulation bandwidth of 42 GHz and a

steady-state extinction ratio larger than 11 dB has been reported. The open eye diagram

obtained at 50 Gb/s presents a dynamic extinction ratio of 9.8 dB, with a driving votage swing

of only 2 V. To the best of our knowledge, this is the fastest silicon-based modulator

demonstrated and can be integrated with hybrid silicon lasers for high-speed optical

interconnects.

We have demonstrated the first hybrid silicon evanescent electroabsorption modulator with offset AlGaInAs quantum well. The fabricated device has DC extinction ratio over 10dB at 4V and 2.5V bias for 100 μm and 250μm long absorber respectively. The on-chip loss for a device with one 100μm absorber and 2 tapers is around 3dB. The small signal modulation bandwidths are 9.5GHz and 7.0GHz respectively. We showed a clear eye opening at 10Gb/s with peak to peak drive voltage of 0.82V at either length. The current device is RC limited to 10GHz bandwidth and has been demonstrated that it can be improved to 16GHz with reduced capacitance. By employing a traveling wave electrode with a longer absorber, we can further improve the bandwidth and extinction ratio. The approach developed here is not limited by the relatively weak, relatively slow response of carrier injection Si modulators.

Xin:

We report a five-channel WDM modulator module that heterogeneously integrates a 200 GHz

channel-spacing arrayed waveguide grating multiplexer and a 20 Gbps electro-absorption modulator array reaching 100 Gbps capacity. The total size of the device is 1.5x0.5 mm2 . The

bandwidth of each modulator is around 17 GHz enabling 20 Gbps and 28Gbps modulation.

The device modulation bandwidth can be further enhanced by reducing the device length (thereby decreasing the RC) or introducing a travelling wave design. The realization of the module on a hybrid silicon photonic platform allows in a next step to co-integrate the laser sources as well.

Me:

In summary, we have demonstrated a new type electroabsorption modulator based on band filling effect. The electroabsorption was bonded on silicon-on-insulator though a bi-level taper coupler. With 100mV bias variation, the DC extinction ratio could be more than 20dB. The exiton absorption peak shifts and intensity variation were in good agreement with simulation results. A clear open eye diagram obtained at 1.25 Gbps with a dynamic extinction ratio of 6.3 dB. The driven peak to peak voltage is only 50 mV. The speed of the present device is limited by carrier lifetime and can be further improvement by using modulation-doped multi-quantum wells. The insertion loss and transient energy consumption can be further improved with optimized fabrication processes.

A new way to make low voltage driven electroabsorption modulator based on band-filling effect is demonstrated. The electroabsorption modulator composed of InGaAlAs quantum wells is integrated on silicon-on-insulator wafer. The band-filling effect happens when electroabsorption modulator is worked at forward bias. In this way, the exciton absorption blue shifts and the absorption intensity almost keeps same. We fabricated 80 μm long compact electroabsorption modulator bonded on silicon-on-insulator wafer. In static transmission performance, we can achieve extinction ratio more than 20dB with only 100mV bias variation. In high speed transmission performance, we show a 1.25Gbps electroabsorption modulator, with only 50mV peak-peak drive voltage and the extinction ratio is 6.3dB. This indicates that the present band-filling effect in electroabsorption modulator provides a novel method for low driven voltage optical modulator.