Hybrid Graphene-Silicon Photonics Devices for Telecom and Datacom

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Abstract

Integration of graphene and other 2D-materials with optical waveguides allows to precisely tailor the interaction strength of these 2D-materials with light. Over the past years several groups have used this approach to realize integrated detectors, modulators and switches. For datacom applications in particular an amplitude modulator that can be driven directly from high-end CMOS circuits and provides sufficient extinction ratio could form a breakthrough device. In initial work [1] we demonstrated 10GBit/s amplitude modulation from devices as short as 50μm. Particular interesting is the broad operation range in terms of wavelength and temperature independence. A challenge to be solved is the trade-off to be found between drive voltage and modulation efficiency for these capacitive devices. In [2] we studied this tradeoff for different waveguide configurations, see also Figure 1. In the presentation we will further discuss these challenges, possible approaches to overcome them and the potential impact for datacom applications. In addition we will present some recent results on the integration of modulators and WDM devices and the measurement of the non-linear response of hybrid graphene-waveguide devices [2][5].

References

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Figures

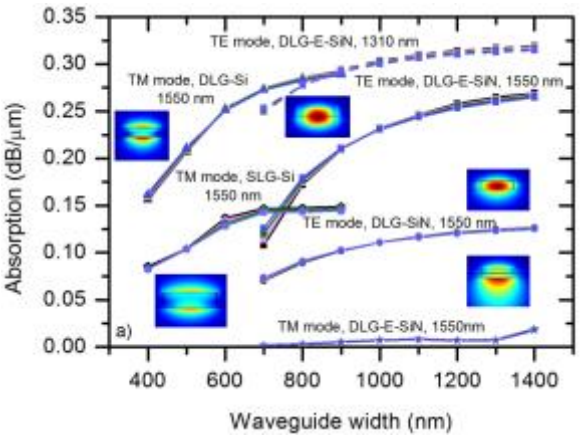

Figure 1: Strength of graphene - optical mode interaction in different waveguide types (from [3])