

Research Highlights

In the last 17 years, Prof Tsang's group focused on experimental research in silicon photonics. Highlights include the first experimental studies of optical Kerr effect [1], Two Photon Absorption [1] and stimulated Raman scattering in silicon waveguides [3,4], the demonstration of chirped waveguide gratings for vertical coupling [5], the first experimental demonstration of nanohole subwavelength gratings for engineering the grating strength of grating couplers [5], demonstration of apodization of gratings which could couple light efficiently into silicon nanowire waveguides [6], the use of subwavelength gratings to reducing the polarization dependence of waveguide grating couplers [7] and to increase the optical bandwidth of grating couplers [8]. His group was one of the first to exploit the hybrid integration of graphene directly on silicon waveguides, and demonstrated an integrated mid-infrared graphene on silicon photodetector [9]. They also carried out the first experimental studies of spectral hole burning [10] and carrier dynamics [11] in graphene on silicon waveguides. His group has also contributed to advancing the use of silicon photonics for energy efficient high speed optical interconnects including studies on the compatibility of silicon modulators for linear modulation using advanced modulation formats [12] and the use of advanced modulation formats with mode division multiplexing in optical interconnects. They also the application of hyperuniform disordered structures in silicon photonics for polarizers [14] and the first demonstration of fully suspended slot waveguides which offer enhanced sensitivity to refractive index in integrated optical sensors [15].

Selected Papers:

- 1 H.K. Tsang, T.K. Liang, C.S. Wong, I.E. Day, S.W. Roberts, A. Harpin, J. Drake and M. Asghari, "Optical Dispersion, Two-Photon Absorption and Self-Phase Modulation in Silicon Waveguides at 1.5 μm Wavelength Appl. Phys. Lett., 80, 416-419, 2002.
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- 3 T.K. Liang and H.K. Tsang : "Efficient Raman Amplification In Silicon-On-Insulator Waveguides" Appl. Phys. Lett. 85, 3343-3345, 2004.
- 4 X. Chen, C. Li, and H. K. Tsang, "Fabrication-tolerant waveguide chirped grating coupler for coupling to a perfectly vertical optical fiber," IEEE Photon. Technol. Lett. 20, 1914-1916, 2008.
- 5 X. Chen and H.K. Tsang: "Nanoholes Grating Couplers for Coupling Between Silicon-on-Insulator Waveguides and Optical Fibers," IEEE Photonics Journal, 1, 184-190, 2009.

- 6 X. Chen, C. Li, C.K.Y. Fung, S.M.G. Lo, and H.K. Tsang, "Apodized Waveguide Grating Couplers for Efficient Coupling to Optical Fibers," *IEEE Photon. Technol. Lett.*, 22, 1156-1158, 2010.
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- 11 Z. Cheng, H.K.Tsang, X. Wang, K. Xu, and J.B. Xu "In-Plane Optical Absorption and Free Carrier Absorption in Graphene-on-Silicon Waveguides," *IEEE J. Sel Top. Quant. Electron.* 20, 43-48, 2014.
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- 13 X. Wu, Chaoran Huang, Ke Xu, Chester Shu, and Hon Ki Tsang, "Mode-Division Multiplexing for Silicon Photonic Network-on-chip," *Journal of Lightwave Technology*, DOI: 10.1109/JLT.2017.2677085 2017.
- 14 W. Zhou, Z.Cheng, B.Q.Zhu, X.K. Sun and H.K. Tsang:" Hyperuniform Disordered Network Polarizers" *IEEE J. Sel. Top,Quantum Electronics* 22, 4901307, 2016.
- 15 Wen Zhou, Zhenzhou Cheng, Xinru Wu, Bingqing Zhu, Xiankai Sun, and Hon Ki Tsang, "Fully suspended slot waveguides for high refractive index sensitivity," *Opt. Lett.* 42, 1245-1248 2017