CV for **Hon Ki TSANG,** Fellow IEEE, Fellow of Optica, Chartered Engineer

Personal information

Full Name: Hon Ki TSANG
Office Address: Room 309 Ho Sin Hang Engineering Building, Department of Electronic Engineering, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong SAR, China
E-mail Address: hktsang@ee.cuhk.edu.hk
Webpage (URL): **http://www.ee.cuhk.edu.hk/~hktsang**

EDUCATION

1991 PhD, University of Cambridge.

Thesis title: "Optical Nonlinearities in Quantum Well Waveguides"

Thesis advisor: Ian H. White (currently Vice-Chancellor of Bath University, UK)

1987 BA Honours, University of Cambridge (1991 MA, University of Cambridge)

- Engineering part I (General engineering covers the foundations for Electrical, Mechanical and Civil Engineering), and Electrical and Information Sciences Tripos; Life Member of Queens' College.

Career Summary

2016-now	Director, Center for Advanced Research in Photonics, CUHK
2018-now	Professor and Associate Dean (Research) of Faculty of Engineering, CUHK
2010-16	Chairman, Department of Electronic Engineering, CUHK
2003-	Professor, CUHK
2001-03	Director and Product Group Head, Bookham Technology plc (Oxfordshire, UK)
1996-2001	Associate Professor, CUHK
1993-1996	Lecturer / Assistant Professor, CUHK
1991-1993	SERC Postdoctoral Fellow, University of Bath (UK)
1990-1991	Visiting Researcher (8 months), Bell Communications Research, (NJ, USA)
1987-1990	PhD student at Cambridge University
1983-1984	Undergraduate Student Trainee, GEC Telecommunications plc (Coventry, UK)

RESEARCH Keywords:

Silicon Photonics; Optical Communications and optical interconnects; Integrated Quantum Photonics; Optical Coherence Tomography; Two dimensional optoelectronic materials

Research Activities

Hon Ki Tsang received PhD degree from University of Cambridge in 1991, and then took up a SERC Postdoctoral Fellowship at the University of Bath before he joined CUHK in 1993. His work during his PhD and postdoc was on III-V quantum well optical waveguide devices for high-speed modulators and nonlinear devices. In 2000 he steered his research in a new direction after he saw the growing opportunities for the then emerging field of silicon photonics. He has now worked on silicon photonics for over 20 years and his research today have four main thrusts: (i) developing the new technologies to enable mode multiplexed multimode fiber communications in data center interconnects – this is a potentially revolutionary new direction in optical fiber communications which can enable low-cost energy efficient multi-terabit/s optical transceivers which can support the continued exponential growth of internet data traffic; (ii) integrated optical sensors and three dimensional imaging systems including integrated spectrometers for optical coherence tomography and multimode imaging sensors, (iii) integrated quantum optics for quantum enhanced sensing and quantum computing, and (iv) silicon photonics for optical matrix processors and optical signal processing. He also has continuing research interests in advancing the device technologies fo waveguider grating couplers, photodiodes and hybrid integration of 2-D materials for

photodiodes and modulators. He has published over 400 papers (Google H-index ~50) and his most notable contributions in silicon photonics include

(i) Making the first measurements of the Kerr nonlinear coefficient, two photon absorption coefficient of silicon waveguides at 1550nm, and the first to propose the now widely accepted model of nonlinear losses in silicon waveguides from Two Photon Absorption (TPA) and free carrier absorption. The first demonstration of high net gain silicon Raman amplifiers in 2004. More recently we developed a model and demonstrated ultralow threshold multimode integrated Raman lasers and low threshold anti-stokes Raman lasing in multimode silicon resonators.

(ii) Various advances for waveguide grating couplers including the first realization of nano-holes subwavelength grating couplers designed using Rytov's effective medium theory, high-efficiency waveguide gratings couplers by using variable duty cycle apodization, polarization independent grating couplers, wideband grating couplers, vertical grating couplers arrays for multicore fibers and multimode grating couplers for mode division multiplexing.

(iii) The first demonstration of graphene on silicon waveguide heterostructure photodiode (this won the 2014 Natural Science Scientific Achievement (2nd Class) award in 2014 from the Ministry of Education in China). We have also developed hybrid integration of dichalcogenides for nonlinear optics, high speed photodiodes and enhancing the efficiency of four wave mixing.

Awards and Fellowships and Professional Appointments

2019 Fellow of IEEE for contributions to nonlinear silicon photonics and advanced waveguide grating couplers.

2018 Elected as Fellow of the Optical Society (OSA, renamed as OPTICA in 2021) for contributions to nonlinear silicon photonics, sub-wavelength silicon waveguide gratings, and hybrid integration of graphene on silicon waveguides.

2017 -22 as Editor-in Chief of IEEE Journal of Quantum Electronics

2017 Visiting Fellow, Clare Hall College, University of Cambridge

2017 Vice Chancellor's Award of "Outstanding Fellow of Faculty of Engineering" (only 2 Professors were selected as VC Outstanding Fellows in CUHK in 2017).

2014 Natural Science Scientific Achievement (2nd class) Awards 2014 by the Ministry of Education, Peoples' Republic of China.

2013-17 Member of RGC GRF Engineering Panel;

The Chinese University of Hong Kong – Vice-Chancellor's Research Excellence Award 2007

Classroom Courses taught in 2021/22

ELEG 4312 Microoptic Devices and Systems
ELEG 5301 Photonic Integrated Circuits
ENGG 3802 Introduction to Engineering Entrepreneurship
ELEG 5755 Optical Communications and Interconnects

Selected List of Plenary/Keynote/Invited

"Silicon Photonics Applications and Some Recent Advances," **Plenary Talk at Optics & Photonics Taiwan International Conference (OPTIC)**, Kaohsiung, 3rd December 2021
https://optic2021.conf.tw/site/page.aspx?pid=18&sid=1387&lang=en

"Silicon Photonics for Spatial-Division Multiplexing and Advanced Optical Transceivers," **IEEE International Conference on Solid-State Circuits (ISSCC 2021)**, Invited 45 minute Talk at Forum 6 (F6): Optical and Electrical Transceivers for 400GbE and Beyond, (online presentation) 2021. https://ieeexplore.ieee.org/document/9365982

"Bound states in the continuum for photonic integration and InP membranes for heralded single photon generation" **SPIE Photonics Europe** Strasbourg, France 2020 (**Recording of Talk available at** https://doi.org/10.1117/12.2558401) ; Proceedings Volume 11364, Integrated Photonics Platforms: Fundamental Research, Manufacturing and Applications; 113640X (2020)