

### Seminar On

## Lithium niobate nanophotonics – bridging the electromagnetic spectrum for future communications

By

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**Date : 12 June 2018 (Tuesday)**  
**Time : 04:00 pm – 05:00 pm**  
**Venue : Room 15-202, meeting room of State Key Laboratory of Millimeter Waves,  
15/F, Lau Ming Wai Academic Building, City University of Hong Kong**

#### Abstract

Lithium niobate (LN) is an excellent nonlinear optical material widely deployed for telecommunications and wavelength conversion. While its high  $\chi^2$  nonlinearity, wide transparency window and low optical loss offer unique advantages, conventional LN devices are bulky and discrete due to the low index-contrast in ion-exchanged waveguides. In this talk, I will provide a summary of our recent breakthrough in integrated LN photonics that overcomes this limitation by direct etching in thin-film LN. We show that waveguides and resonators with sub-wavelength light confinement and extremely low propagation loss ( $< 0.03$  dB/cm) can be fabricated using standard lithography techniques. Together with the strong electro-optic and nonlinear responses, we demonstrate electro-optic modulators with CMOS-compatible driving voltage of 1.4 V and at the same time electro-optic bandwidths up to 100 GHz. Leveraging the high nonlinear-optic coefficient, we demonstrate Kerr and electro-optic frequency comb generation, as well as efficient nonlinear wavelength conversion. The high-performance LN nanophotonic platform could open up avenues for a chip-scale photonic integrated circuit densely integrated with non-classic light sources, high-speed switches, filters and wavelength converters, which could find applications in next-generation optical data links, quantum communications and microwave/terahertz photonics.

#### Biography

**Dr WANG Cheng** received his B.S. degree in Microelectronics from Tsinghua University in 2012. Afterwards, he joined Harvard University as a Ph.D. student in the School of Engineering and Applied Sciences, advised by Prof. Marko Loncar. Cheng received his S.M. and Ph.D. degrees, both in Electrical Engineering from Harvard University, in May 2015 and May 2017, respectively. After conducting research as a postdoctoral fellow at Harvard University, Cheng joined City University of Hong Kong as an Assistant Professor in June 2018. Cheng's research focuses on enhancing light-matter interaction in nanophotonic structures. Cheng's current research effort focuses on realizing an integrated lithium niobate photonic circuit for applications in optical communications and nonlinear optics.

**\*\*\* ALL ARE WELCOME \*\*\***

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