OSSC Online Webinar, April 7, 2021, 6:00pm

"Recent Advances in Thin-film Lithium Niobate Integrated Photonics"

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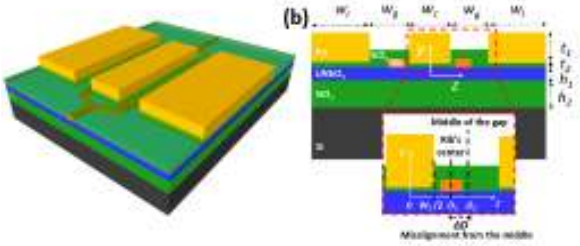

Abstract

The excellent electrooptic and nonlinear-optical properties of lithium niobate have long established it as a prevailing photonic material for the long-haul telecom modulator and wavelength-converter markets. However, conventional lithium niobate optical waveguides are low index-contrast, and hence bulky compared to modern integrated platforms such as silicon photonics. The bulkiness impedes photonic circuit implementations and imposes high optical power requirements for nonlinear applications.

To address these shortcomings, thin-film lithium niobate wafers and high-contrast waveguides (with submicron cross-sectional dimensions) were developed for the first time at CREOL in 2013. Since then, we have demonstrated a plethora of ultracompact integrated photonic devices and circuits (waveguides, microring resonators, modulators, grating couplers, wavelength converters, entangled photon sources, etc.) with significantly superior performances than the conventional lithium niobate counterparts.

More recently, commercial availability of the thin-film wafers has facilitated entering of several other research teams into this growing field. The overall efforts have rejuvenated lithium niobate for novel electrooptic and nonlinear- and quantum-optic applications and the material is considered among the top candidates for heterogeneous integrated photonics. That is when multiple materials are monolithically integrated on the same silicon chip, while each material is chosen for the functionalities that suits it best. Progress in thin-film lithium niobate integrated photonics, its future directions, opportunities and challenges will be discussed.

About our Speaker

Dr. Sasan Fathpour is a Professor at CREOL, The College of Optics and Photonics at the University of Central Florida (UCF). He received the PhD degree in Electrical Engineering from the Univ. of Michigan, Ann Arbor in 2005. His current research interests include heterogeneous integrated photonics, nonlinear integrated optics, silicon photonics, and unconventional photonic platforms operating in the mid-wave- and near-infrared and visible wavelength ranges. His CREOL team's research at has been highlighted in Nature Photonics, Optics and Photonics News, Laser Focus World, photonics.com and several other trade magazines and professional websites.

Prof. Fathpour has received the US National Science Foundation (NSF) CAREER Award (2012) and the Office of Naval Research (ONR) Young Investigator Program Award (2013). He has been Guest Editor of SPIE's Journal of Nanophotonics (2014-15), Symposium Co-Chair of the 2015 Materials Research Society (MRS) Fall Meeting, and Chair (2014-2016) and Vice-Chair (2012-2014) of Short Courses at the Conference on Lasers and Electro-optics, CLEO. He has been a technical program committee member of several conferences, including CLEO (2016-18) and Frontiers in Optics (FiO 2016), IEEE International Conference on Electron Devices and Solid-State Circuits (EDSSC) (2017), IEEE Photonics Society Summer Topicals Meeting Series (2017), IEEE Electron Devices Society (EDS) (2017–2019), and European MRS (2019).

Dr. Fathpour is a co-author of over 180 publications, including about 40 invited journal papers and conference presentations, 6 book chapters and 3 patents. He co-edited the book *Silicon Photonics for Telecommunications and Biomedicine,* CRC Press (2012). He is the cofounder of Partow Technologies, LLC, is a Fellow of OSA, a Senior Member of IEEE and SPIE and a Member of MRS.