

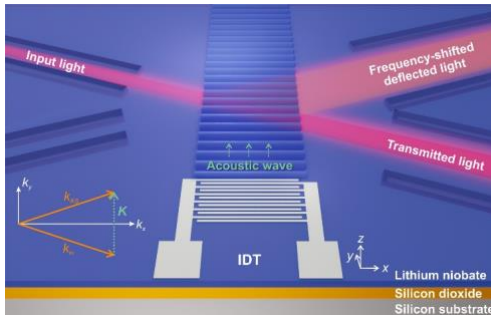


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Lithium niobate acousto-optic frequency shifter

Integrated Acousto-optics on Thin-film Lithium Niobate

Abstract: Scattering optical light by acoustic waves, or namely Brillouin scattering, has enabled various optical devices from modulators, frequency shifters, frequency comb generators, ultra-narrow-linewidth lasers, and nonreciprocal isolators. The strong piezoelectricity and photoelasticity of thin-film lithium niobate with its low propagation loss for optical light and acoustic waves provide a promising platform for integrated acousto-optics. In this talk, we explore two acousto-optic devices that we recently developed on thin-film lithium niobate. The first device is an integrated acousto-optic frequency shifter. The traveling acoustic wave on lithium niobate thin film shifts the optical frequency by a few gigahertz, which is much higher than the current acousto-optic frequency shifter based on bulk materials. The second device is an integrated microwave-to-optical converter, where the high-quality-factor acoustic resonator efficiently mediates the conversion between the microwave signals and the optical modes.

About the speaker: Linbo Shao recently passed his Ph.D. defense and stays as a postdoctoral researcher at Harvard John A. Paulson School of Engineering and Applied Sciences. He is a member of the laboratory for nanoscale optics led by Prof. Marko Lončar. His research started from microwave imaging using nitrogen-vacancy centers in diamond, and later moved to hybrid microwave, acoustic, and optical devices on the integrated lithium niobate (LN) platform. He developed high-Q surface acoustic wave (SAW) resonators, acousto-optic modulators, microwave-to-optical converters, and nonreciprocal SAW isolators on the LN platform. He also worked on chaotic optical cavities and their applications in sensing and ion transport in nanofluidic devices. He obtained his B.S. in microelectronics in 2014 from Peking University. He received the China Youth Science and Technology Innovation Award for his exploration in science and technology.

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