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Heterogeneously integrated lithium niobate photonic platform

Despite the achievements to date, widespread adoption of $LiNbO_3$ integrated photonics is still impeded by several key issues such as CMOS compatibility, wafer-scale yield, and edge fiber-to-chip coupling [1]. As an alternative to conventional bulk $LiNbO_3$ and ridge waveguide-based photonic devices, hybrid platforms emerged recently, combining thin-film $LiNbO_3$ with waveguides made of Si, Si_3N_4, or Ta_2O_5 [2,3]. However, direct wafer bonding at the wafer level was not achieved (only small chiplets were used), and the approaches could not retain the ultra-low propagation losses of Si_3N_4. In this talk we demonstrate a wafer-scale approach to lithium niobate integrated photonics with propagation losses comparable to the Si_3N_4 state-of-the-art values. We achieve it by combining TFLN with the Photonic Damascene platform [4], well-known for its wafer-scale high-yield loss. We also discuss some of the limitations and design aspects of the platform as well as the experimental observations.

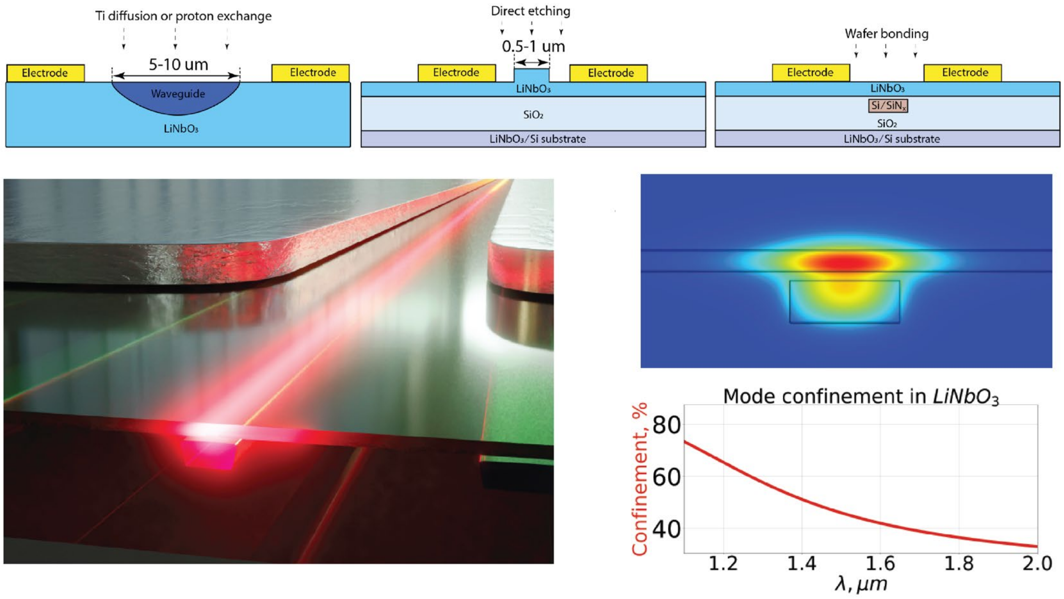

Figure 1: Different approaches to lithium niobate photonics. Hybridized mode and optical mode confinement in lithium niobate.

References

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