

ON-CHIP ELECTRO-OPTIC FEW-CYCLE PULSE GENERATION

Tech ID: 34064 / UC Case 2025-147-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

On-chip ultrafast light devices with a compact footprint and low cost would provide a practical platform for applications such as optical signal processing, molecular sensing, microwave generation and nonlinear optical processes. With the help of recent advances in nanofabrication techniques, the ability to reach low propagation loss on-chip has driven the development of high-quality (Q) factor microresonators. These microresonators allow for microcomb and pulse generation under intense continuous wave (CW) pumping. However, low nonlinear conversion efficiencies and high repetition rates, fixed by the resonator geometry, make achieving ultrashort pulses with high peak power remains an ongoing challenge.

To overcome these challenges, UC Berkeley researchers have demonstrated the integration of an electro-optic-comb system and dispersion-engineered nonlinear waveguides on a thin-film lithium niobate platform. The compact, on-chip device can achieve 35-fs pulse generation, corresponding to 6.7 cycles at 1550 nm, via higher-order soliton compression. The present invention facilitates development of ultrafast nano-optics and nano-electronics.

SUGGESTED USES

- » Optical signal processing
- » Molecular sensing
- » Microwave generation
- » Nonlinear optical processes

ADVANTAGES

- » Ultrashort (35-fs) pulses
- » High peak powers
- » Compact integration, thin-film lithium niobite platform

RELATED MATERIALS

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OTHER INFORMATION

CATEGORIZED AS

- » **Optics and Photonics**
 - » All Optics and Photonics
- » **Communications**
 - » Optical
 - » Other
- » **Computer**
 - » Hardware
- » **Engineering**
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