

Linear and Nonlinear Nano Photonics

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Integrated optical high-index contrast waveguides confine light to very narrow spatial regions. Considerable work has been devoted in the past decade to develop low-loss strip waveguides (nano wires), slot waveguides, and ring-shaped structures. For any given technology, the design can be done with numerical tools.

It is, however, still challenging to make a low-loss transition from a strip waveguide (where light is concentrated in the high-index material) to a slot waveguide (where light is guided in the low-index material). A design of a strip-slot transition that avoids sub-100 nm features will be discussed.

The strong light confinement in high-index contrast waveguides calls for exploiting nonlinearities. Choosing from a multitude of nonlinear nano-phonic devices, the talks treats efficient second-order nonlinear frequency generation, presents results for high-speed silicon-organic hybrid (SOH) and GaAs modulators, illustrates the capabilities of a plasmonic modulator, and demonstrates comb line generation with a third-order nonlinear silicon nitride ring resonator.