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Frequency agile hybrid integrated piezo-electric tunable lasers

Frequency-agile low-noise laser sources with wide tunability are one of the core technologies for coherent photonic sensing and communication applications. Low-cost laser with the performance of bulky laser system would pave the way to large scale industrial deployment of photonic sensors, e.g. frequency modulated continuous wave (FMCW) distance ranging for the automotive industry, tight laser locking in quantum applications, spectroscopy. Here we review the most recent achievements of photonic chip-based hybrid integrated lasers. These recently emerged class of lasers are compact and wafer scale manufacturable, but have crucially demonstrated laser noise below a fiber laser – the gold standard in coherence – and achieved unprecedentedly fast tuning [1]. Also, we demonstrate how to transfer this concept to on-chip external cavity laser platform [2, 3].

References

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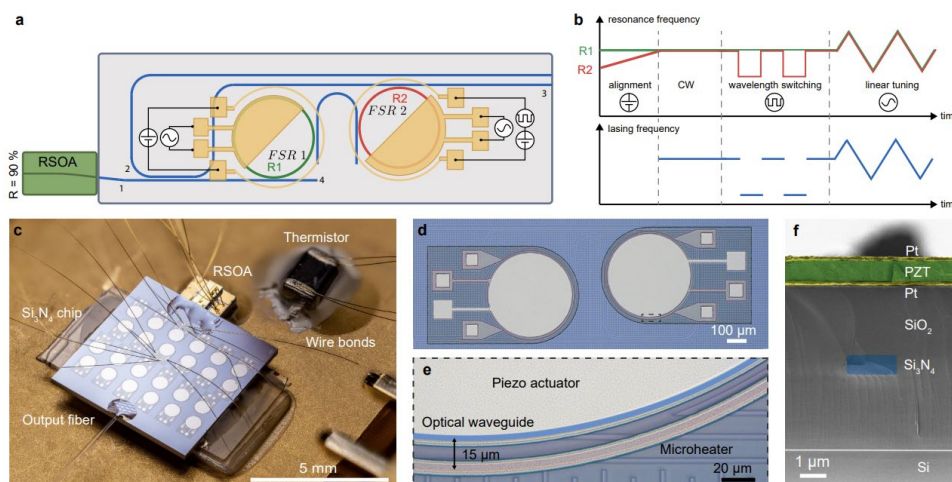


Figure 1: (a) Schematics of the laser. (b) Laser frequency tuning schematic. (c) Photo of a packaged laser in a butterfly package. (d) Photo of Si₃N₄ microrings with integrated PZT actuators and electrodes. (e) Zoom in photo showing microheater strip 15 μm away from Si₃N₄ waveguide. (f) Colored SEM image of the sample cross-section, showing the piezoelectric actuator integrated on the Si₃N₄ chip.