IDF INNOV

From invention to innovation

PICOMETER PRECISION SPECTRAL TUNING OF MICRO AND NANOPHOTONIC RESONATORS

Photoelectrochemical etching process able to achieve picometer precision for spectral tuning of micro and nanophotonic resonators. The method is highly precise, both spatially and spectrally, and provides tuning over a broad spectral range.

Nanophotonics ▪ Optical resonators ▪ Silicon photonics ▪ High precision spectral tuning ▪ Photoelectrochemical etching

APPLICATIONS

- Telecom / datacom : optical routing and multiplexing, semiconductor lasers
- Optical sensors : gas sensing, optical gyroscopes

PUBLICATIONS

"High-precision spectral tuning of micro and nanophotonic cavities by resonantly enhanced photoelectrochemical etching"

INTELLECTUAL PROPERTY

Patent application

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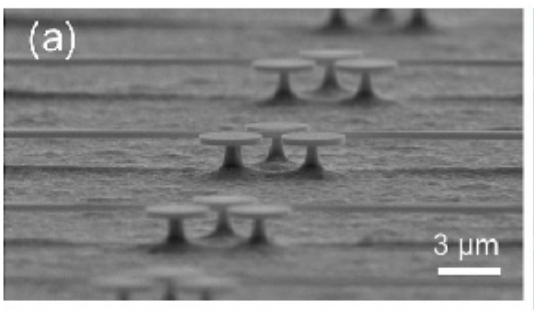
PRESENTATION

State-of-the-art nanofabrication tools (electronic beam lithography, reactive ion etching) can nowadays reach a few nanometer precision. This is still not accurate enough in optical applications such as metrology where collective behavior of resonators is targeted.

Our method reaches picometer precision (3 orders of magnitude better than state-of-the-art). The method consists in shedding light on resonators, so that a light-activated chemical etching process can take place. When using the proper wavelength, light intensity is locally amplified by the resonator. The result is that the resonator is gently etched while its nearby environment remains intact. This technique allows as well collective tuning of several resonators for spectral alignment.



Sets of 3 GaAS resonators and their optical-coupling waveguides. © IDF Innov

COMPETITIVE ADVANTAGES

- Requires basic equipment (tunable telecom laser…)
- Very quick
- Permanent result
- Manufacturing of coupled photonic resonators networks with high quality factor
- Industrial-scalable process (no vacuum nor cryogenic conditions)