Fine Tuner for Resonators (MOS capacitor) (Yissum)

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Very accurate setting of resonant frequency

Categories	Micro & Opto-Electronics, Optoelectronics / Photonics, Semiconductors, Structure and Properties of Materials , Optoelectronic Computing & Optical Communication, Advanced Semiconductors, Dielectric Properties
Development Stage	Theoretical model developed. Initial proof of concept
Patent Status	Patent application filed in the United States

Highlights

- A major problem related to the use of photonic resonators in optical systems is the accuracy of setting the resonance wavelength. Fabrication imperfections and environmental effects such as temperature change may cause deviations from the desired resonance wavelength.
- This deviation can be compensated for by controlling the refractive index of the resonating medium either actively, e.g. by the use of the thermo optic effect, or passively, by the use of trimming approaches.
- The need for a constant power supply for heating the structure is a major drawback in the thermo optic approach. In addition, maintaining a constant difference in temperature between two adjacent resonators on a chip is challenging.
- The trimming approach has been used in polymer and glass structures but until now, has not been applicable for silicon resonators in a manufacturable way.

Our Innovation

We developed a novel solution for the trimming of photonic resonators in silicon, based on creating an electrically controllable space charge in the silicon structure. This approach enables both controlled trimming of the resonance wavelength as well as its dynamic change around its set value. This combined feature paves the way for numerous applications in communications, coding, security etc.

Key Features

- Proper selection of parameters enables static as well as dynamic control of the resonance frequency in an amount that is not apparent to external observers.
- The change of the resonant frequency can reach 10 Gigahertz and beyond.

Development Milestones

Seeking research funding to advance the project as well as industry cooperation.

The Opportunity

Can be used in optical communications, switching and filtering as well as for secure coding applications where the control centre can dynamically change the code with no way for an

interceptor to break the code.

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