



Nanoelectromechanical Switch in Co-Planar Waveguide

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Inventors: Robert Blick, Hua Qin, Hyun-Seok Kim

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a co-planar waveguide that uses a NEMSET electromechanical signal switch for signal modulation.

Overview

Microelectromechanical systems (MEMS) and nanoelectromechanical systems (NEMS) have been used to create mechanical resonators for switching, filtering and other purposes in electrical systems. NEMS/MEMS offer many benefits, including being compatible with silicon processing, impervious to radiation and able to withstand high operation frequencies. WARF holds an issued patent on a previous development of a nano-electro-mechanical single electron transistor (NEMSET), which is uniquely suited for combination with a co-planar waveguide (also called a co-planar transmission line).

The Invention

UW-Madison researchers have developed a co-planar waveguide that uses a NEMSET electromechanical signal switch for signal modulation. The NEMSET switch acts as a natural communication pathway between co-planar elements of co-planar waveguides. The device operates in the frequency range of 1MHz to 2GHz to filter, modulate, mix and rectify microwave signals. This waveguide could be used in the same way as a traditional waveguide in electrical engineering, but with the benefits of NEMSET and a co-planar structure.

Applications

- Devices such as mixers, rectifiers or modulators

Key Benefits

- Nonlinear characteristic of NEMSET device allows construction of more complex devices such as mixers, rectifiers and modulators.
- Direct-current (DC) control of the frequency of the mechanically resonating NEMSET switch may produce a variety of devices such as mixers, modulators and rectifiers.
- NEMSET device structure allows simple fabrication.
- May serve as a building block to produce either bandpass or band-reject filters, which attenuate certain frequencies
- Impedance and impedance-matching may be controlled independently of the resonant frequency of NEMSET device.

Tech Fields

- [Analytical Instrumentation, Methods & Materials : Optics](#)
- [Engineering : Micro & nanotechnologies](#)
- [Semiconductors & Integrated Circuits : Other semiconductor technologies](#)

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