Tunable FSS for Long-Duration Remote Chemical Sensing

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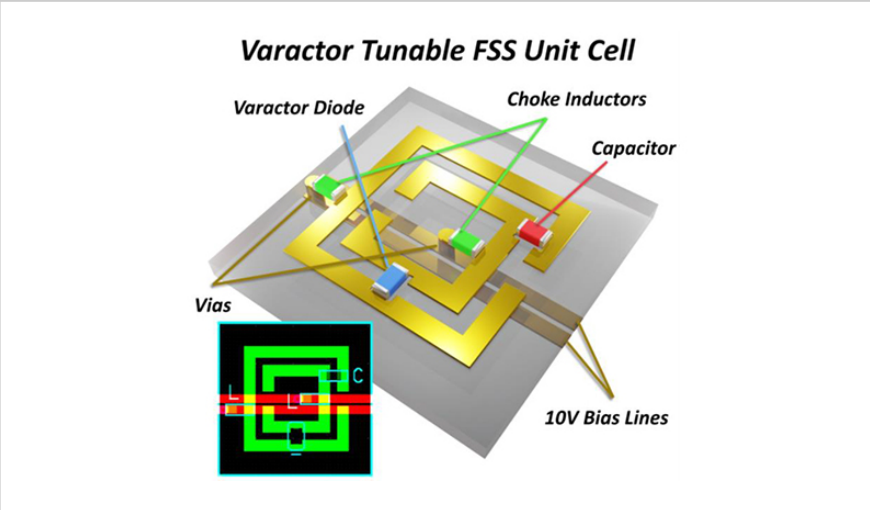

Varactor Tunable FSS Unit Cell

Technology Summary

This tech. is a low-power varactor-tunable frequency selective surface (FSS) and controller, for use with a multiplexed remote sensor system. Combined with a low power sensor, the controller affects a voltage biasing of the FSS panel, which can be used to modulate the center frequency of an RF reflection peak. This peak can in turn be detected by remote interrogation through a RADAR system. In order to realize a set-and-forget sensor platform which has a long operational battery-life, the control board and FSS were designed to be low power, drawing only 200 µA of current during typical operation from two CR2032 batteries. When coupled with a suitably low power sensor, this system could be in continuous operation for weeks at a time, which is ideal in situations where physical access to the platform is unsafe or impossible. Centered at 3 GHz, the backscatter peak can be modulated across a range of 200 MHz which provides a substantial range for communicating multiple toxin concentrations, although the design may be in principle applied at other center freqs.

Application & Market Utility

Similar tech. have either attempted to integrate passive chemically-sensitive elements requiring no power, or required RF broadcasting at the location of sensing. Other methods have been very difficult to realize due to a lack of variety in selectively chem.-sensitive materials. This tech., which simultaneously can be actively modulated for multiple chem. detection and has a low power draw, overcomes the drawbacks of the other methods. Users of this technology may incorporate it with low power sensor platforms for deploying into potentially unsafe or inaccessible locations where they desire to remotely identify the presence of dangerous chemicals for a long period of time.

Next Steps

The research team seeks investment and licensing opportunities.

TECHNOLOGY READINESS LEVEL 4-7

Seeking

Investment | Licensing | Research

Keywords

- Tunable
- Frequency selective surface
- Remote sensing
- Varactor
- Low power

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