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A contactless high frequency LC-resonant sensor for bioenvironmental monitoring

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Coil-based resonant sensors have become an increasingly popular topic of conversation in numerous scientific fields due to their usefulness in a variety of applications. We present here an optimized coil-based sensor for a resonance-perturbing effect owing to different media. The electrical impedance of the LC-resonance based sensor, arising from the coupling between the resonator and medium, was measured in a wide range of frequency between 1 MHz and 1000 MHz using an Agilent 419RF Impedance Analyzer. Our analysis reveals that the change in impedance and the shift in resonance frequency are related to the dielectric constant (ε) of the medium. A comparative study was performed in ionic solutions for different transition metal elements such as Mn, Fe, and Co. The measured impedance shows an increase with increase in the concentration of the ionic solution. For an identical concentration, the observed difference in the impedance change with respect to different transition metal elements shows the excellent selectivity of the sensor. This high-frequency LC-resonance sensor is well suited for real-time monitoring of organic contaminants in water and industrial bio-safety control.

Biography

Chiran Witanachchi is a graduate student from University of South Florida .

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