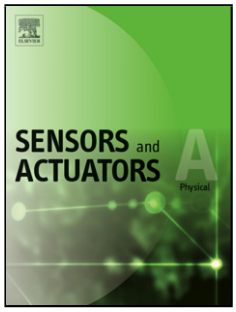

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Split Ring Resonator With Optimised Sensitivity For Microfluidic Sensing

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Highlights

- Microfluidic sensing using a split ring resonator (SRR) with the sample parallel to the electric field to improve its sensitivity.
- Different pH levels sensing using two types of common acid and alkaline (HCl and NaOH).
- High sensitivity measurements recorded due to small changes in salt (NaCl) concentrations.

Abstract

In this paper we describe a microwave sensor for microfluidic sensing using a split ring resonator (SRR) with the sample parallel to the electric field to improve its sensitivity. It is designed to operate at 2.5 GHz with a 3 mm active gap region, over a volume of approximately 10 mm^3. The SRR has been tested with microliter volumes of several common solvents, namely, water, methanol, ethanol, and chloroform, with excellent agreement between simulated and experimental results. Furthermore, two types of common acid and alkaline (HCl and NaOH) have been tested at different pH levels. The sensor showed very good sensitivity for pH change and all the results were found to be statistically significant between the pH groups. The SRR was also shown to be highly sensitive to small changes in salt (NaCl) concentrations. Compared to traditional techniques, this miniaturised SRR method is compatible with lab-on-chip approaches.

Keywords: microwave sensor, microfluidic resonator, split ring resonator, microwave cavity.

1. Introduction