

Sensitivity enhancement of chemical sensor using aligned-gap split ring resonator

ABSTRACT

A modified Split Ring Resonator named Aligned Gap Split Ring Resonator was experimentally presented as a sensing element for characterization of solvents at 4.89GHz microwave frequency. The results demonstrated a good agreement between simulation and fabrication measurement. The proposed sensor demonstrated a strong localized electric field at sensing area with high Q factor value of 240 which indicate a very good sensitivity of the sensor. The sensing approach was based on distinguishing a shift in resonance frequency of the sensor when a dielectric material is introduced at the gaps of the sensing element. A remarkable shifts of resonance frequencies with the maximum value of 400MHz were observed upon introduction of several solvents. The sensitivity of the sensor was obtained as $0.001/\epsilon$ with respect to changes in permittivity value of the solvents.

Keyword: Sensor; Metamaterial; Split ring resonator; Solvent characterization; Sensitivity