

## Assessment of High Frequency Solidly Mounted Resonator as Viscosity Sensor

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**Abstract :** Solidly Acoustic Resonators (SMR) based on ZnO piezoelectric material operating at a frequency of 3.96 GHz and 6.49% coupling factor are used to characterize liquids with different viscosities. This behavior of the sensor is analyzed using Finite Element Modeling. Device architectures encapsulate bulk acoustic wave resonators with MO/SiO<sub>2</sub> Bragg mirror reflector and the silicon substrate. The proposed SMR is based on the mass loading effect response of the sensor to the change in the resonant frequency of the resonator that is caused by the increased density due to the absorption of liquids (water, acetone, olive oil) used in theoretical calculation. The sensitivity of sensors ranges from 0.238 MHz/mPa.s to 83.33 MHz/mPa.s, supported by the Kanazawa model. Obtained results are also compared with previous works on BAW viscosity sensors.

**Keywords :** solidly mounted resonator, bragg mirror, kanazawa model, finite element model

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