

Effect of the c-axis tilting angle in piezoelectric ZnO crystal on the performances of electroacoustic SAW sensors

Farouk LAIDOU DI, Fayçal Medjili, Hassene NEZZARI, Mouloud Mebarki, Fouad Boubenider

Abstract : This paper aims to study the effect of c-axis tilting angle of piezoelectric ZnO/Si on the performances of electroacoustic SAW sensors, the dispersion curves of phase velocity, the electromechanical coupling factor K^2 and sensitivity to mass loading of Rayleigh and Sezawa modes are studied for different $h\text{ZnO}/\lambda$ and for different c-tilting angles (0, θ , 90°). The effect of the tilting angle θ on the performances of electroacoustic devices, is studied by finite element analysis. Based on the obtained results, SAW device is fabricated onto a ZnO/SiO₂/Si multilayered structure. The obtained results show best performances and high sensitivity to gas and will contribute in enhancing the sensitivity and performances of SAW electroacoustic devices.

Keywords : surface acoustic waves, electroacoustic devices, Finite Element Analysis, Piezoelectric materials, c-tilted ZnO