

## Detecting phase shifts in surface plasmon resonance by polarization heterodyne interferometry

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### Abstract

Among the different surface plasmon-based measurement techniques, the detection of phase of surface plasmon is one of the most accurate and sensitive methods. The phase can be measured accurately in different interference-based techniques. In this study, the phase and intensity of the surface plasmon were simulated and then the phase shift of surface plasmon wave was experimentally measured by heterodyne polarization interferometry. The response of sensing head to the refractive index change of surrounding medium was obtained. According to the obtained results, the average sensitivity of the phase in the solution of water/alcohol was  $0.4426 \text{ deg } \text{ree} / \% \text{ gr/ml}$  and for the solution of water/glucose was  $1.4765 \text{ deg } \text{ree} / \% \text{ gr/ml}$ . The detection limit for solution of water/alcohol and the solution of water/glucose were measured  $0.49 \% \text{ gr/ml}$  and  $0.14 \% \text{ gr/ml}$ , respectively.

**Keyword:** surface plasmon resonance, refractive index sensor, polarization heterodyne interferometry, phase shift

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