**ABSTRACT**

 In the last few decades, Surface Plasmon Resonance technique has become highly influential for its chemical, bio-chemical and gas sensing applications due to its compactness, flexibility and reliability. Transparent conducting oxide like In2O3 are of immense interest due to their good electrical conductivity property and high transparency in the visible and infra red region. A study on the performance of spr based fiber optic sensor with nanocomposites has been carried out numerically and investigated. Nanocomposites comprising of Co and Ni nanoparticles with their varying volume fractions embedded in the host dielectric matrices of Indium Oxide are considered for the study. The metal nanoparticles exhibit tremendous optical properties originating from the surface plasmons and hence show better sensing performance than materials in the macro or large scales. By varying the thickness of the nanocomposite for various volume fractions, the performance parameters such as FWHM, sensitivity and Q-factor of the sensor were studied and analyzed. The sensitivity of Ni/In2O3 nanocomposites based sensor shows better performance for all thicknesses with any volume fraction compared to Co/In2O3 nanocomposites. It is observed that the sensitivity of the sensor increases with increase in both thickness of the nanocomposites and the volume fraction of metal nanoparticles. The usage of Co and Ni in the place of noble metals has curtailed the cost of the spr sensor.