**ABSTRACT**

Over the past few decades, researchers have shown immense interest in surface plasmon resonance (SPR) sensing which utilizes the fascinating light matter involved at a metal dielectric interface. The technique of Surface plasmon resonance has become a highly influential method employed for quick and accurate measurements of physical, chemical and biochemical parameters and also in gas sensing applications due to its high field confinement, high sensitivity, compactness, flexibility and reliability. The benefits of the SPR based fiber optic sensor are miniaturization of the probe and its utilization in remote sensing applications that is not achievable with prism based SPR sensors. The main objective is to focus on the theoretical study of SPR based fiber optic sensors with few chosen metal nanocomposite layers coated on the core of the optical fiber for sensitivity enhancement. The attenuated total internal reflection method along with Krestchmann configuration has been used to analyze the sensor parameters. Nanocomposites consisting of cobalt (Co) and nickel (Ni) nanoparticles with their varying volume fractions embedded in host dielectric matrices of In2O3 and TiO2 are considered for the present study and the sensitivity evaluation has been carried out. . The thickness of the metal layer, its dielectric constants and the thickness, length and refractive index of the sensing layer is properly chosen and the sensitivity evaluation is done. The sensitivity was found to increase with increase in the thickness of nanocomposites as well as the volume fraction of metal nanoparticles. Among the various metal nanocomposite combinations studied, SPR sensor of Ni with TiO2 layer shows the highest sensitivity. The proposed sensor is observed to have high sensitivity and good response as compared to conventional Au/Ag metal-deposited SPR sensors so the usage of Co and Ni in place of noble metals (such as gold and silver) curtails the cost of SPR sensor.