**ABSTRACT**

Surface Plasmon Resonance base fiber optic sensor with bi layers of Pt- TiO2 is theoretically analysed. The Pt layer over TiO2 layer has been shown to improve the sensitivity of SPR sensor, The sensitivity of the proposed sensor enhances linearly with the increase in the refractive index of the sensing medium for all thicknesses of Pt layers, with increase in TiO2 layer thickness. SPR based fiber optic sensor with bi layers of 50 nm Pt-200nm TiO2 displays the highest sensitivity of 18000 nm/RIU.