**ABSTRACT**

The technology and applications of optical fiber have progressed very rapidly in the recent years. A detailed theoretical analysis on the performance of single and bimetal iridium layer coated on a core of an optical fiber. By varying the structure of the iridium as thin film, nanoparticle and grating, the performance of the spr based fiber optic sensor is studied and compared in detail. To study the performance of the sensor, we calculated the sensitivity, Reflection coefficient, Q factor and FWHM using Iridium with other spr active metals. Interestingly, as the thickness of the iridium layer increases, dominance of inverted surface plasmon resonance character of iridium was also observed and analyzed. At specific conditions, iridium exhibits normal as well as inverted spr characteristics. The proposed sensor finds application in various fields.