**ABSTRACT**

The technique of Surface plasmon resonance has become a highly influential method for its chemical and bio-chemical sensor applications due to its compactness and reliability. Surface plasmon resonance based fiber optic sensor with an alternating dielectric multilayer system is theoretically studied in detail. The dielectric system is constructed with alternate silica and titanium oxide layers sandwiched between the metal of study. Besides prevention of metallic layer from oxidation, it also enhances the sensitivity, tunability of the resonance wavelength region, bio-compatibility and capability of gas sensing. The effect of various design attributes on the sensitivity and detection accuracy of the sensor is studied for three different metal layers.. Based on the study, a new optical model of a fiber optic spr gas sensor is proposed.