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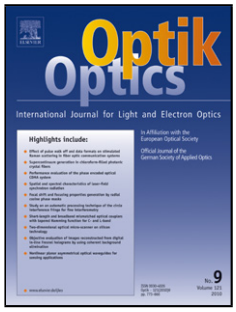

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Design of high performance surface plasmon resonance biosensor using silver-based sinusoidal diffraction grating

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Abstract. A high performance sinusoidal grating-based surface plasmon resonance (SPR) biosensor is proposed. The angular interrogation method has been used to study the performance of the sensor. The sensitivity as well as the width of the SPR curves and reflective amplitude is considered for designing the sensor. Compared with the gold(Au)-based SPR sensor, we find that the silver(Ag)-based sensor has the better performance. Numerical simulations show that the sensitivity of the Ag-based sensor is 193.9°/RIU.

Keywords: Surface plasmon resonance; Biosensor; Sinusoidal grating

1. Introduction

The phenomenon of surface plasmon resonance (SPR) has been demonstrated as a very powerful tool for the detection of biological molecules, such as: biopolymers [1,2], proteins [3-5], etc. There has been a lot of attention paid to the SPR sensing technology due to its great advantages of label-free, high sensitivity and rapid real-time detection [6-11]. In 1968, A. Otto proposed a prism-based structure which used the attenuated total reflection (ATR) method to excite surface plasmon waves (SPWs) [12]. In 1971, E. Kretschmann proposed a better prism structure on this basis, which evaporated the metal film onto the glass block, and do not need to consider the parallelism problem between the prism and metal layer [13]. This kind of prism structure is still in use today, but its disadvantages are also very obvious, that is, not convenient for integration and needing precisely angle control. In 1987, D. C. Cullen proposed the metallic grating structure that can be applied to SPR sensing [14]. Due