

This work is introduced by the description of fundamental properties of surface plasmons, propagating along the metal-dielectric interface and along the structure with thin metal film surrounded by the dielectrics with identical refractive indices. It is shown, that the excitation of two coupled modes (long-range surface plasmon - LRSP and short-range surface plasmon - SRSP) on symmetrical structure with a thin metal film is possible. Further, a brief overview of surface plasmons applications in optical sensors is presented. The diffractive multi-layer structure supporting LRSP and SRSP modes, which consists of the thin gold film surrounded by the dielectrics with slightly different refractive indices is designed. The diffractive structure is optimized using rigorous integral method for an application in SPR sensor. Diffractive structures with optimal parameters are prepared and characterized optically and using atomic force microscopy. In the end, an application of developed diffractive structure in SPR sensor with wavelength modulation is demonstrated.