

Studies on Surface Plasmons — the Interaction with Surface Acoustic Waves and the Application to Biosensing

March, 1991

Sun Xiao Chun

Studies on surface plasmons(SP)were done with special emphasis given to both the interaction of SP with surface acoustic waves(SAW)and the application of SP to biosensing. Experimental and theoretical studies on the interaction of SP with SAW have been carried out to discover what will happen when a SP and a SAW are generated at the same interface between metal and dielectric material. It has been found that the SAW, as a "dynamic" grating, contribute to the momentum-conservation condition for exciting SP and the interaction spectra, depend not only on the dielectric properties of the interface but also on the resonance frequency of the SAW.

By utilizing the interaction spectra of SP with SAW. I was able to study the properties of three types of SP active layers:Ag, Au and Cu films and also the oxidization effect of Ag films. The results demonstrate the potential of this physical phenomenon for evaluating metal films.

As a application of SP, SP biosensors have been developed. In this study, the characteristics of the sensor have been shown theoretically and experimentally regarding the sensitivity, real time measurements and the problem of repeated utilization of sensor. As a result, with an antigen immobilized sensor, the antibody-antigen immunoresponse has been quantitatively detected out along with real time and high sesitivity.