Abstract Submitted
for the NWS19 Meeting of
The American Physical Society

Investigation of Surface Plasmon Resonance Biosensor Sensitivity Using Kretschmann ATR Theory[1] MACKENZIE JEWELL, SARAH CLARK, VALERIE BEALE, KARISSA LANGEVIN, BRAD JOHNSON, JANELLE LEGER, Western Washington University — Surface plasmon resonance (SPR) is a phenomenon wherein an incident photon couples to charge density oscillations on a metal surface, exciting a surface plasmon polariton (SPP). SPPs are interface-confined modes that propagate along metal-dielectric waveguide structures. Attenuated total reflection (ATR) is the method by which a coupling prism is used to excite SPPs. Using ATR, a SPR biosensor monitors binding interactions at a metal surface in real time, as binding results in a shift in SPP excitation conditions. SPR biosensor performance is limited by the sensitivity of detection. Recent evidence suggests that sensitivity can be increased for SPPs with high propagation lengths. SPR biosensors require the Kretschmann ATR configuration, in which the metal film is exposed for monitoring. While Kretschmann ATR is often used experimentally, complete theoretical models for this configuration are lacking. In order to understand the relationship between SPP propagation and biosensor sensitivity, the complete electromagnetic theory must be developed. Here we discuss development of this theory and the correlation to experimental measurements. Our results show a positive correlation between SPP propagation lengths and biosensor sensitivity.

[1]NSF: DMR 1057209

MacKenzie Jewell
Western Washington University

Date submitted: 12 Apr 2019 Electronic form version 1.4