



# Gold Island Film Transducers for Biological Sensing

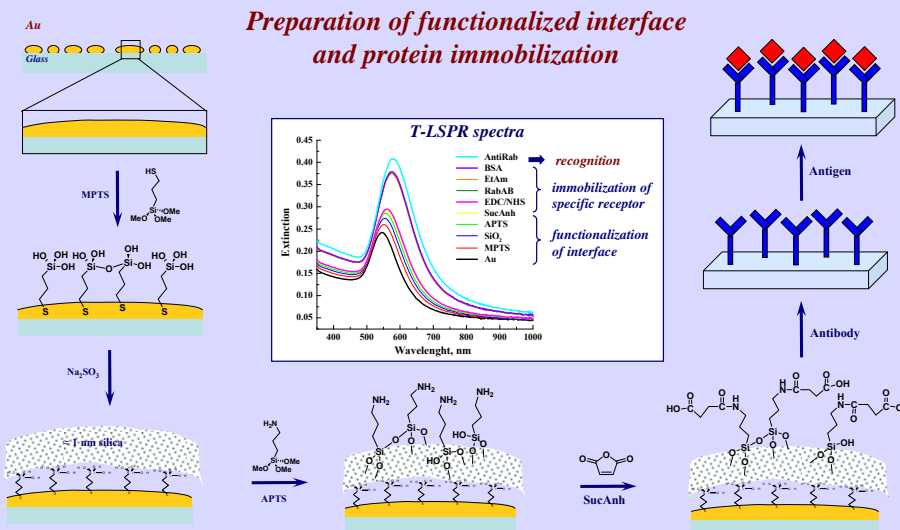
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Discontinuous gold films (typically <10 nm nominal thickness) evaporated on transparent substrates show a localized surface plasmon (SP) extinction in the visible-to-NIR range, conveniently measured by transmission spectroscopy. The SP extinction band is highly sensitive to changes in the dielectric properties of the contacting medium, thus enabling to monitor the binding of molecular layers to the Au island film with submonolayer sensitivity. The method, termed transmission localized surface plasmon resonance (T-LSPR) spectroscopy, provides an effective scheme for label-free biological sensing using basic spectrophotometric equipment.

In the present work the applicability of T-LSPR spectroscopy (using Au island films) to monitoring specific antibody-antigen interactions is demonstrated. T-LSPR transducers were prepared by evaporation of 5 nm (nominal thickness) Au island films on silanized glass slides. Protein recognition interfaces were prepared by stepwise functionalization of the Au islands to carry carboxylate functionalities that covalently link to amino groups of the protein.

The protein-derivatized Au island films were used as a biological recognition surface for selective sensing of antigen binding, distinguishing specific and nonspecific interactions. Specific recognition of antigens was demonstrated using an array of four T-LSPR transducers. Further improvement of the system will allow application of the technique to fast, simultaneous determination of a number of proteins using detector arrays.



## Antibody – Antigen interactions

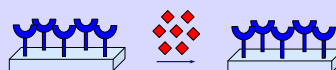
**Antibody:** Rabbit Immunoglobulin G (IgG), Mouse Immunoglobulin G (IgG)

**Antigen:** Anti-Rabbit Immunoglobulin G (IgG), Anti-Mouse Immunoglobulin G (IgG)

**Rabbit – Anti-Rabbit**



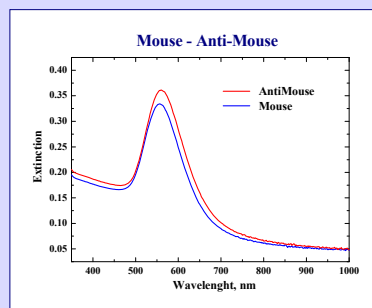
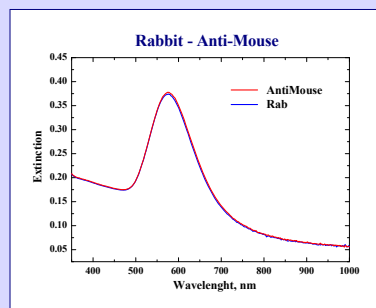
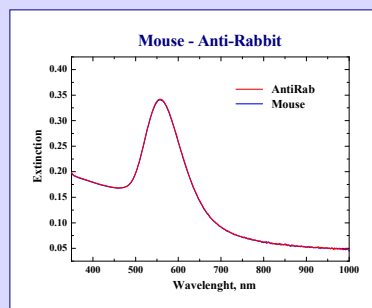
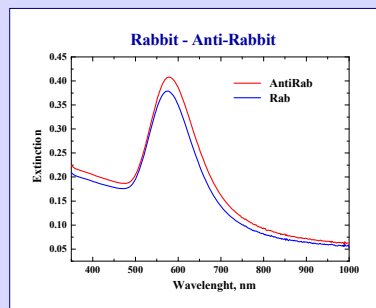
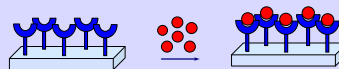
**Mouse – Anti-Rabbit**



**Rabbit – Anti-Mouse**



**Mouse – Anti-Mouse**

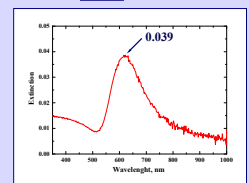
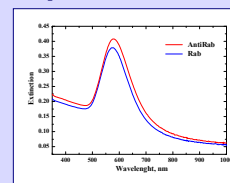


## “3S”: Simplicity, Sensitivity, Stability

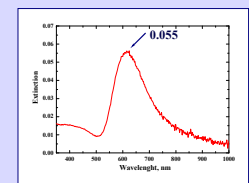
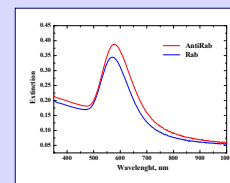
**Absolute spectra**

**Silica-modified Au islands: stable**

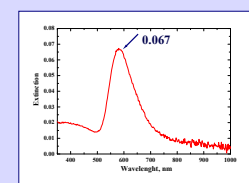
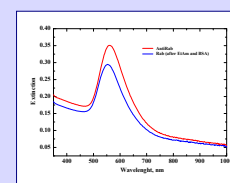
**Difference spectra**



**Mercaptosilane-modified Au islands**



**Bare Au islands: simple, sensitive**



## Summary

Transmission localized surface plasmon resonance (T-LSPR) spectroscopy provides an effective scheme for label-free biological sensing using basic spectrophotometric equipment.

Protein-derivatized Au island films were used as a biological recognition surface for model sensing of antigen binding, showing high selectivity between specific and nonspecific interactions.