

Electrochemical-Surface Plasmon Biosensor for Multiple Analytes Detection

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Urine Sensor Application



It is important to establish the technique to simultaneously detect the glucose and protein which are main constituents in urine.

Simple, convenient, and quick screening for lifestyle diseases etc.

Conventional techniques:

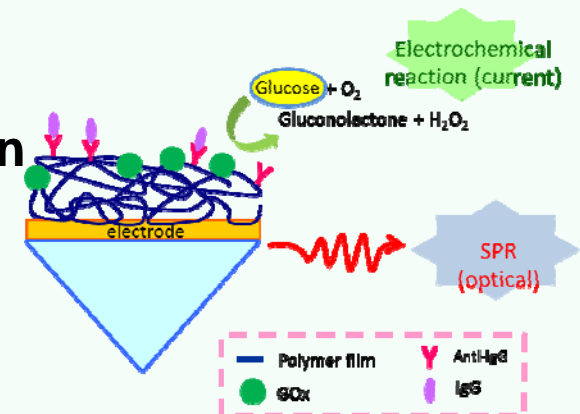
- * Individual experiments for each analyte.
→ several measurements are required
- * Complicated procedure is required for simultaneous measurements.



Our technique

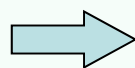
Combination of electrochemical measurement and optical SPR technique.

The electrochemical and optical signals were simultaneously obtained from the electrochemical-SPR biosensor electrode upon the addition of two analytes, glucose and IgG, on the PP3C film.



* **Electrochemical detection:** → detect only glucose

* **SPR detection:** → detect only IgG



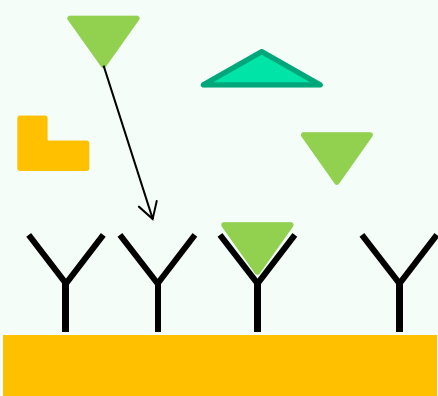
2 analytes can be simultaneously detected

Conducting Polymer Based EC-SPR Biosensor

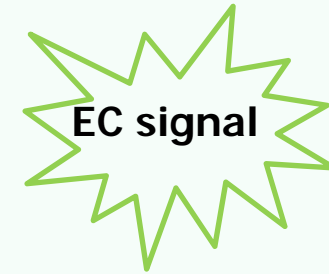
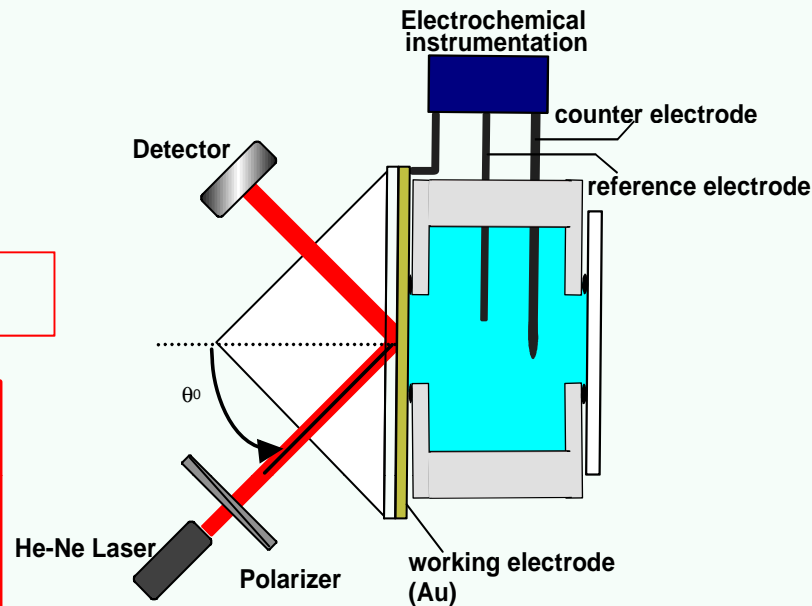


Detection of A-IgG

A-IgG/IgG specific adsorption

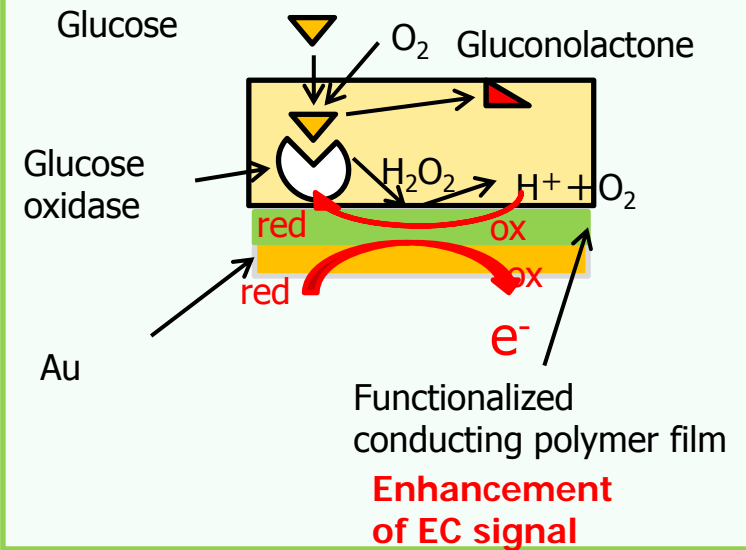


Change in SPR signal



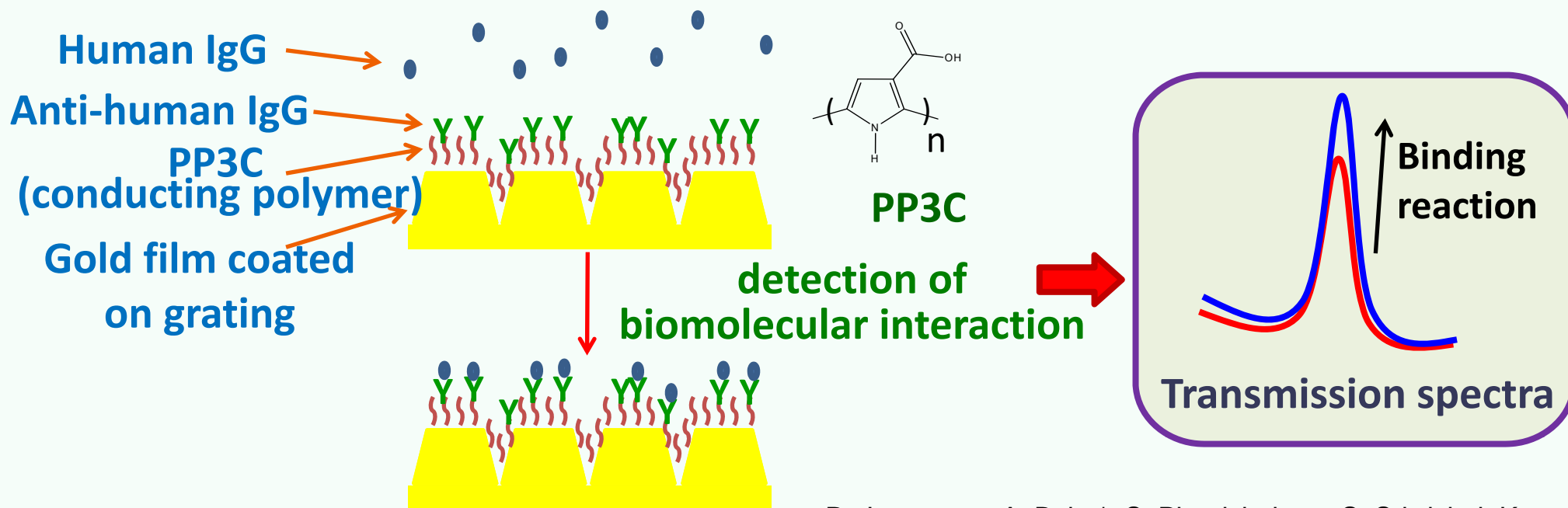
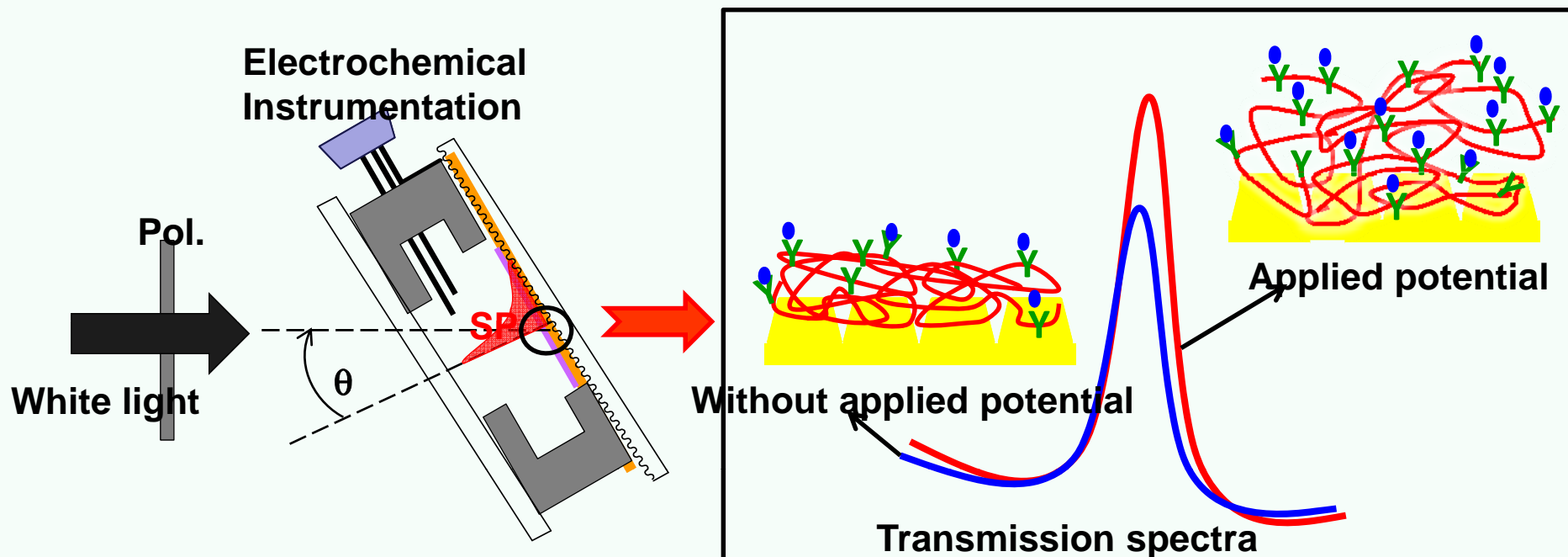
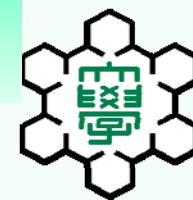
Detection of glucose

Oxidation/reduction reaction with enzymatic GOx

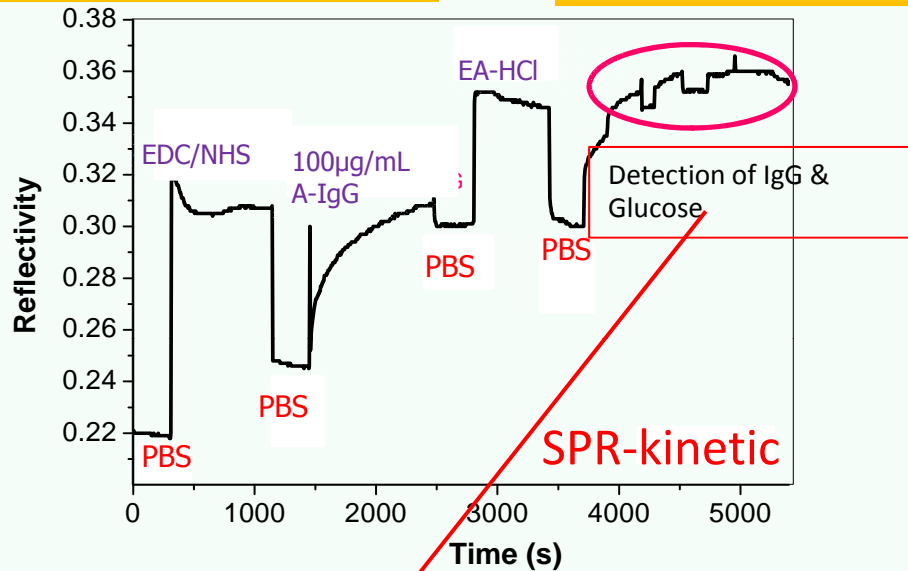
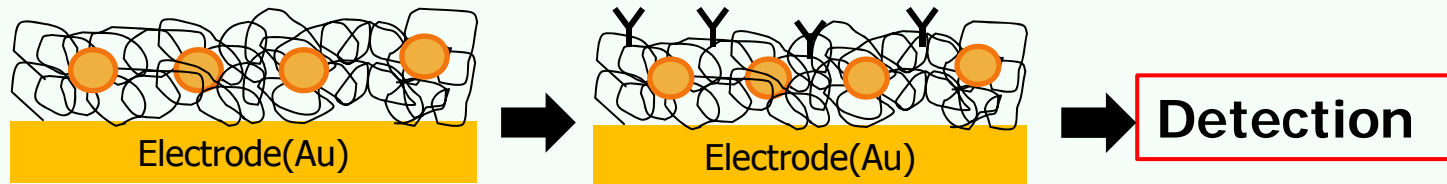


Change in electrochemical signal

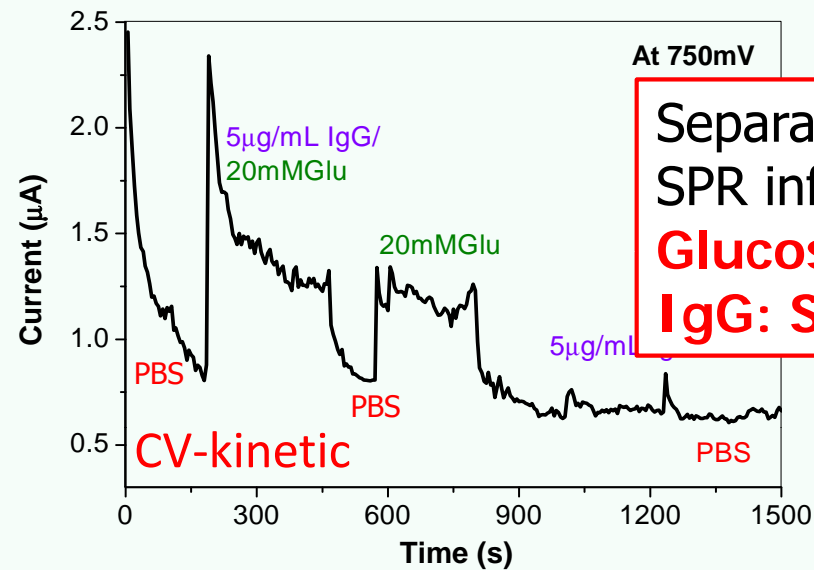
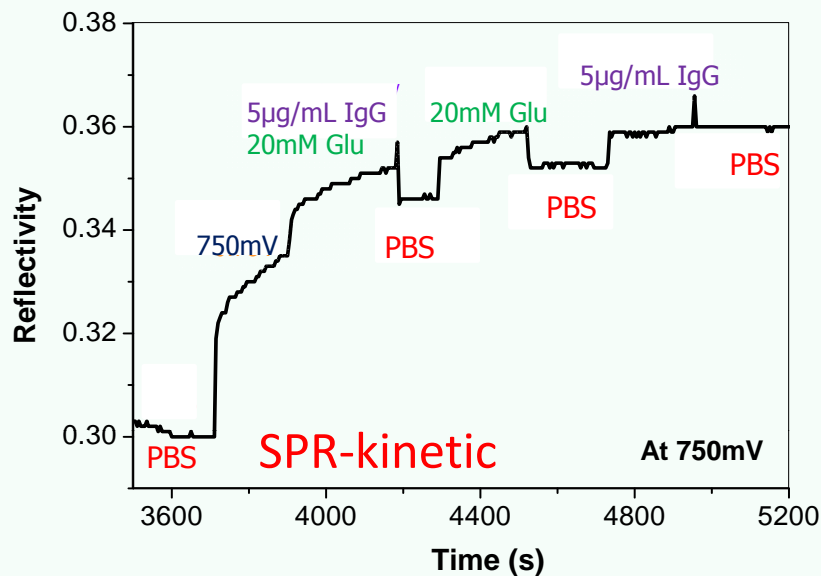
T-SPR Biosensors (Simple, Convenient & Cheap!)



Immobilization of A-IgG, detection of IgG & Glucose



○ Immobilization of A-IgG
 1:1 of 0.4M EDC/0.4M NHS
 100µg/mL A-IgG
 0.2M EA-HCl
 ○ Detection
 20mM Glucose, 5µg/mL IgG
 Potential: 750 mV



Separation of the EC &
 SPR information
Glucose: EC
IgG: SPR

Applications

- Application to many kinds of biosensors by many types of combinations
- Application to biosensors using biofluids or blood
- Diagnosis of lifestyle related disease

Challenges

- Detection of further multiple analytes
- Cost reduction and miniaturization of the sensing system
- Possibility of intellectual property by combination of conducting polymers, patterning

Expectations for company

- Practical application of the patent pending “Multiple Detection Biosensor…”
- Collaboration on the miniaturization and cost reduction of the sensing system

Patent pending

Multiple Detection Biosensor… , 2014-191697

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