

Analytical evaluation of biosensors

Biosensors utilize the fact that chemical substances derived from living organisms, such as enzymes and antibodies, react only with specific substances. Its technology is expected to be applied to a wide range of fields. TRC provides biosensor composition package analysis such as deterioration, durability, stragestability, and evaluation of materials.

What is revealed by a biosensor analysis?

Analysis of another company's products and developed products

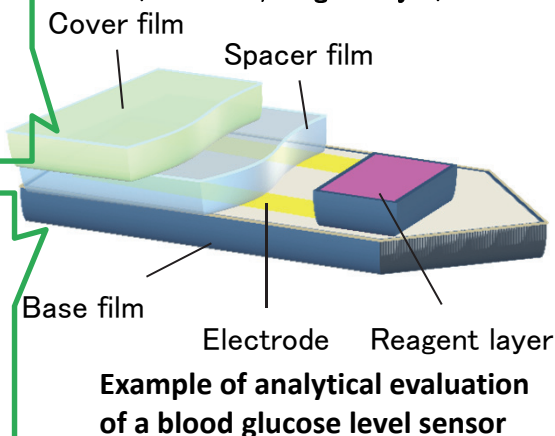
- Sample composition
- Reagent layer composition
- Film material analysis
- Electrode material analysis etc.

Trouble shooting

- Decrease in measurement accuracy
- Reagent layer delamination
- alteration
- Film exfoliation
- discoloration

Morphological observation (OM, SEM)

Configuration, shape observation (electrode, reagent layer)



Reagent layer (enzyme + mediator)

Chemical structure: various mass spectrometry methods, amino acid sequence analysis

Distribution state: TOF – SIMS

Films

Composition / chemical structure information: FT-IR

Electrodes

Composition information: SEM-EDX

State analysis: XPS, TOF-SIMS

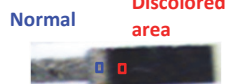
Degradation analysis of blood glucose level sensors

Acceleration test (60 °C, 80%, 3 days)

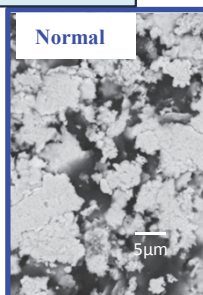
- Electrode resistance was increased by 10%.
- Variation of the resistance value was occurred in reference electrode and working electrode.

Electrode part evaluation

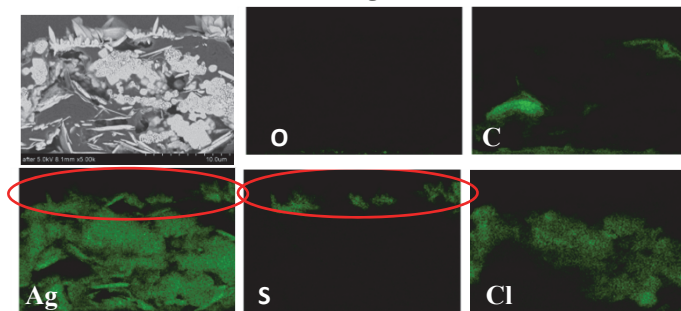
OM image



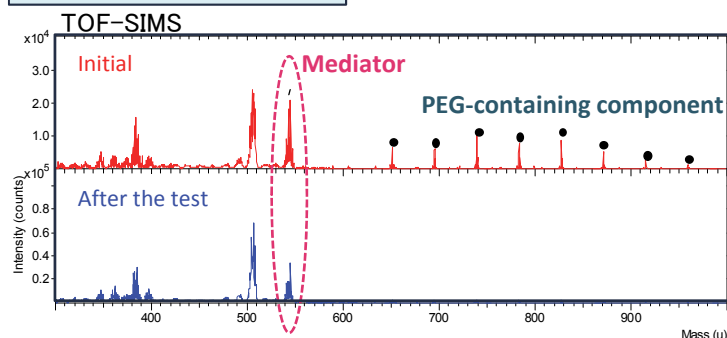
SEM image



Cross-sectional SEM-EDX image at discolored area



Reagent layer evaluation



- ✓ Electrode part: Needle-Shaped material (Ag sulfide) was found at discoloration part.
→ High resistance factor
- ✓ Reagent layer: Reduction of components including mediator and PEG
→ Possibility of alteration or elution

Comprehensive evaluation of the degradation state of various sensors is achieved by these methods!