

Biosensors

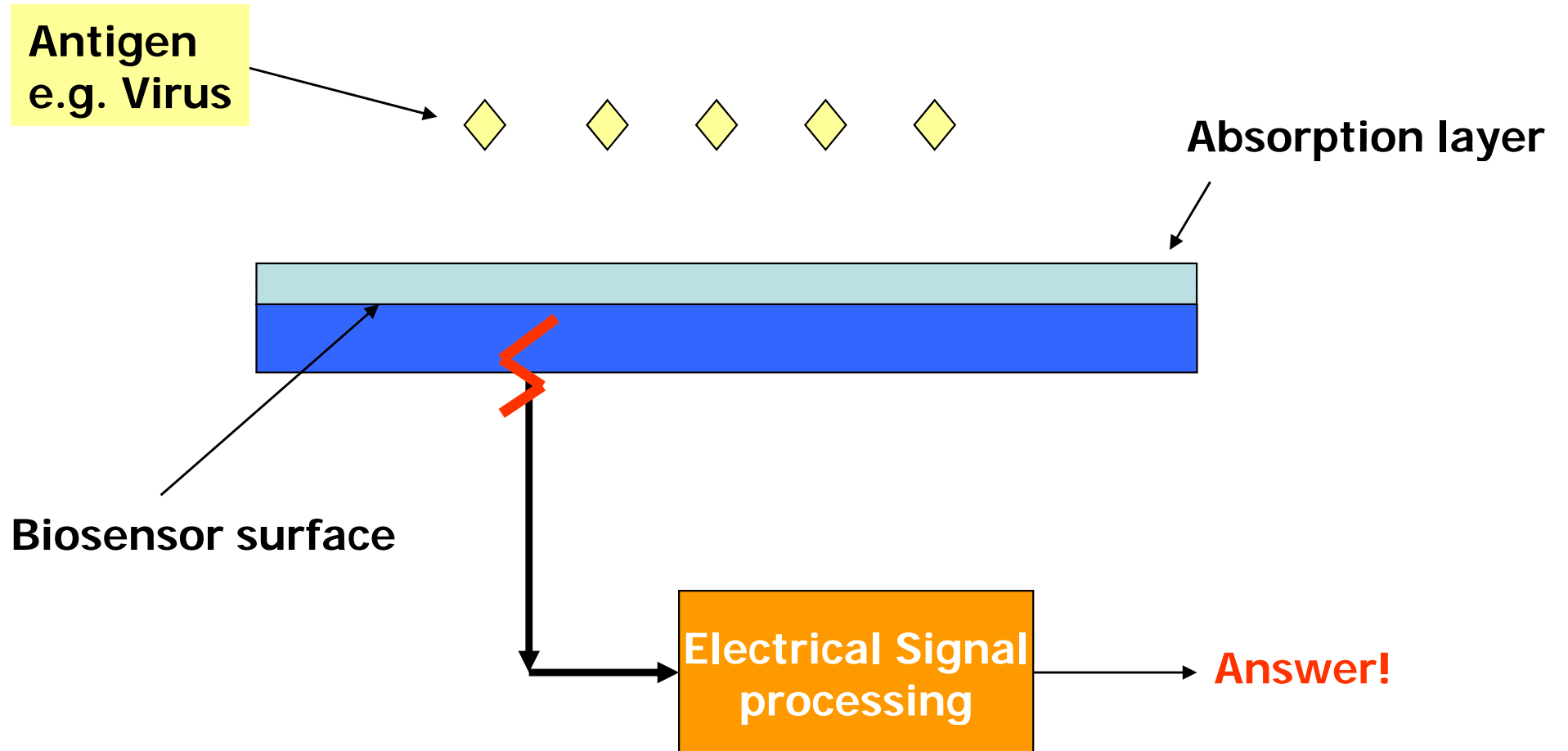
Syllabus Topics

- Week 1 Introduction to biosensors
- Week 2 Fundamentals
- Week 3 Electrochemical biosensors
- Week 4 Optical biosensors – Surface plasmons, Fluorescence
- Week 5 Detection and analytical systems
- Week 6 Mid-term Examination, 30%
- Week 7 Acoustic wave - Bond-rupture biosensors
- Week 8 MEMS materials and processing
- Week 9 Standard microelectronic technologies
- Week 10 Microfabrication
- Week 11 Surface acoustic waves
- Week 12 MEMS-IDT microsensors
- Week 13 Class project, 10%
- Week 14 Signal processing / Sensor arrays and micro total analysis systems
- Week 15 FPGA
- Week 16 Applications
- Week 17 Final Examination, 60%

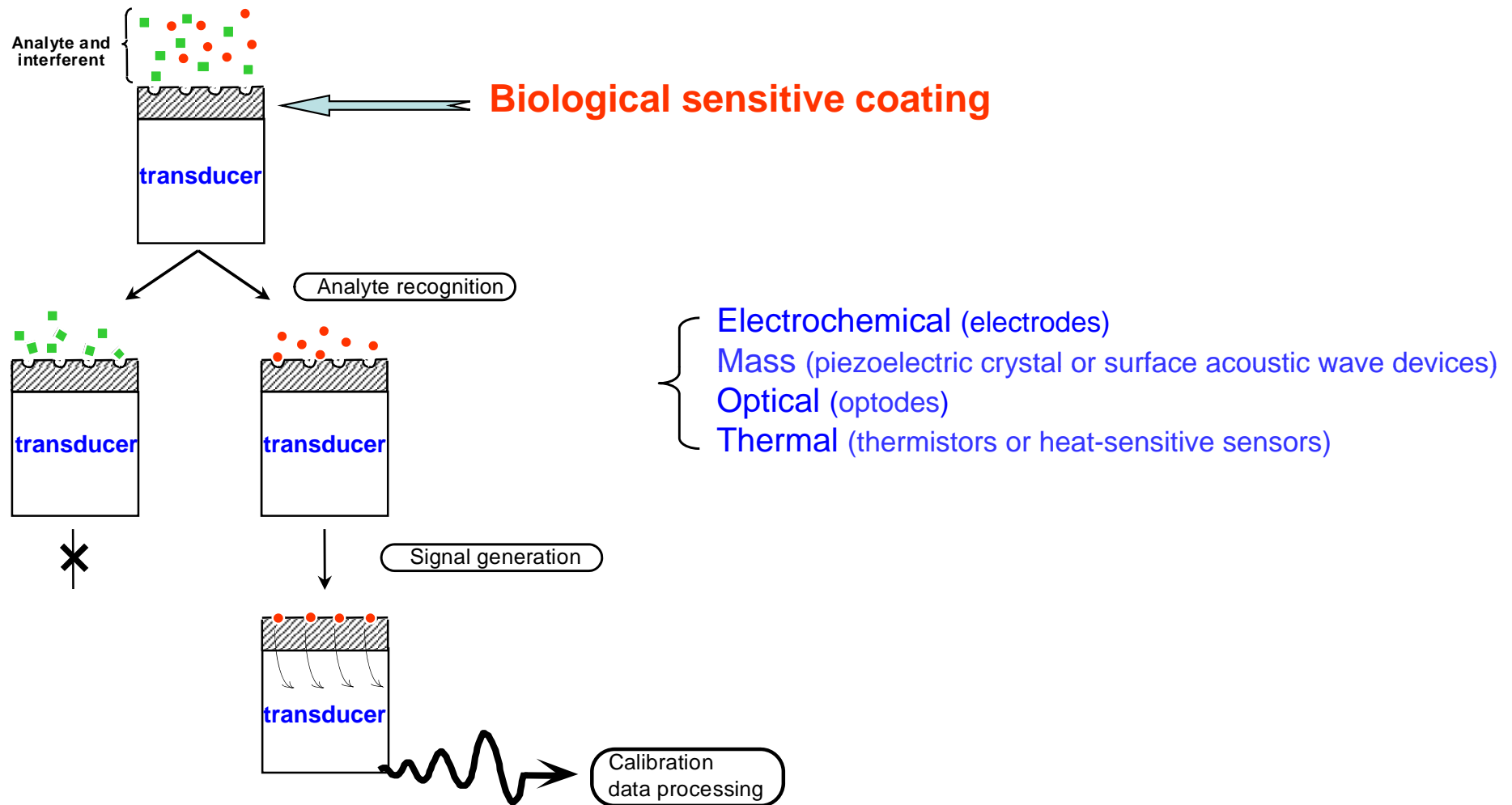
Assignments

1. An Aptamer-Based Quartz Crystal Protein Biosensor
2. RNA-Peptide Binding and the Effect of Inhibitor and RNA Mutation Studied by On-Line Acoustic Wave Sensor
3. A Dual-Frequency QCM-D Setup Operating at Elevated Oscillation Amplitudes
4. Direct and Quantitative Detection of Bacteriophage by “Hearing” Surface Detachment Using a Quartz Crystal Microbalance
5. “Hearing” Bond Breakage. Measurement of Bond Rupture Forces Using a Quartz Crystal Microbalance
6. Detection of Point Mutation and Insertion Mutations in DNA Using a Quartz Crystal Microbalance and MutS, a Mismatch Binding Protein

Biosensors Concept



Schematic of the operation of biosensors



Application of biosensors

- Pharmaceutical research
- Diagnostic testing
- Food safety
- Environmental detection
- others