

## Ma 17- Protein SAM -Quartz Crystal Microbalance

### Prerequisites:

- Piezo-electric effect
- Understanding on the thiol based self assemble chemistry on metal surface

### Physics:

- Chemistry of self-assembled monolayer
- Sauerbrey equation: Relation between the resonance frequency and the adsorbate mass
- Effect of visco-elasticity in the measurement at solid/liquid interfaces (Gordon-Kanazawa equation)
- Molecular interaction between proteins/organic molecules
- Electron transfer at the solid/liquid interface (Electrochemistry)

### Technical:

- Handling of chemicals for the self-assembled monolayer
- Handling of bio-materials (protein)
- Frequency counter
- Cyclic voltammetry (current/voltage relation at the solid/liquid interfaces)

### Data analysis:

- Correct translation from the observed frequency to the adsorption mass, finally to the surface coverage of the molecules.
- Evaluation of the error raised by baseline drift.
- Validation of the obtained surface coverage of the molecules.
- Cross determination of the surface coverage from the electron transfer current (cyclic voltammetry)
- Consideration on the discrepancy of the obtained surface coverage between two methods (QCM and cyclic voltammetry)