

# A Versatile Microplate Tool for Monitoring Bio-Molecular Dynamics: The Case of Decoupling Medium Conductivity from Cell Count

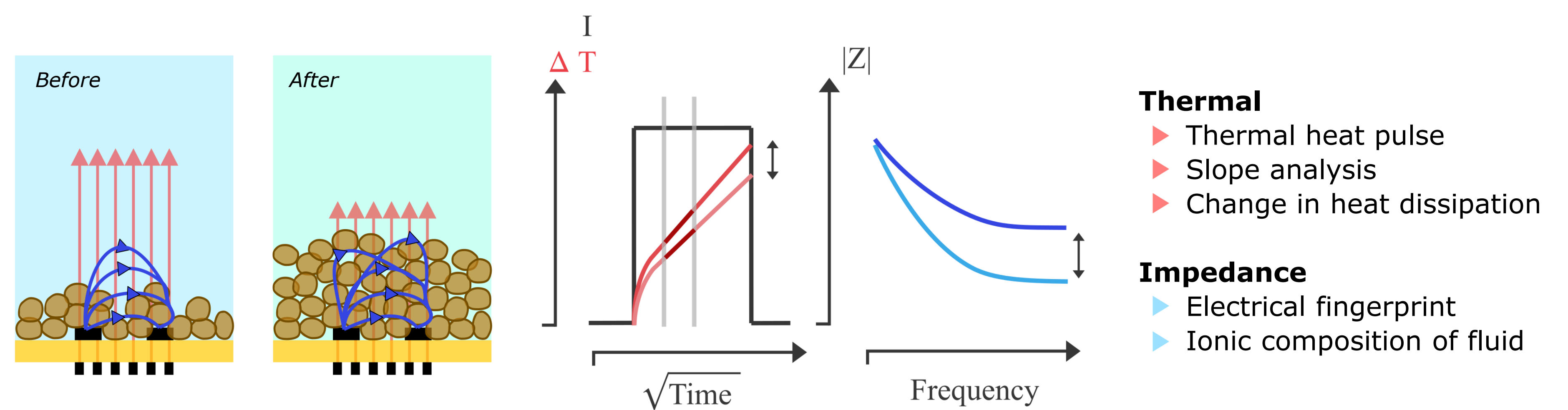
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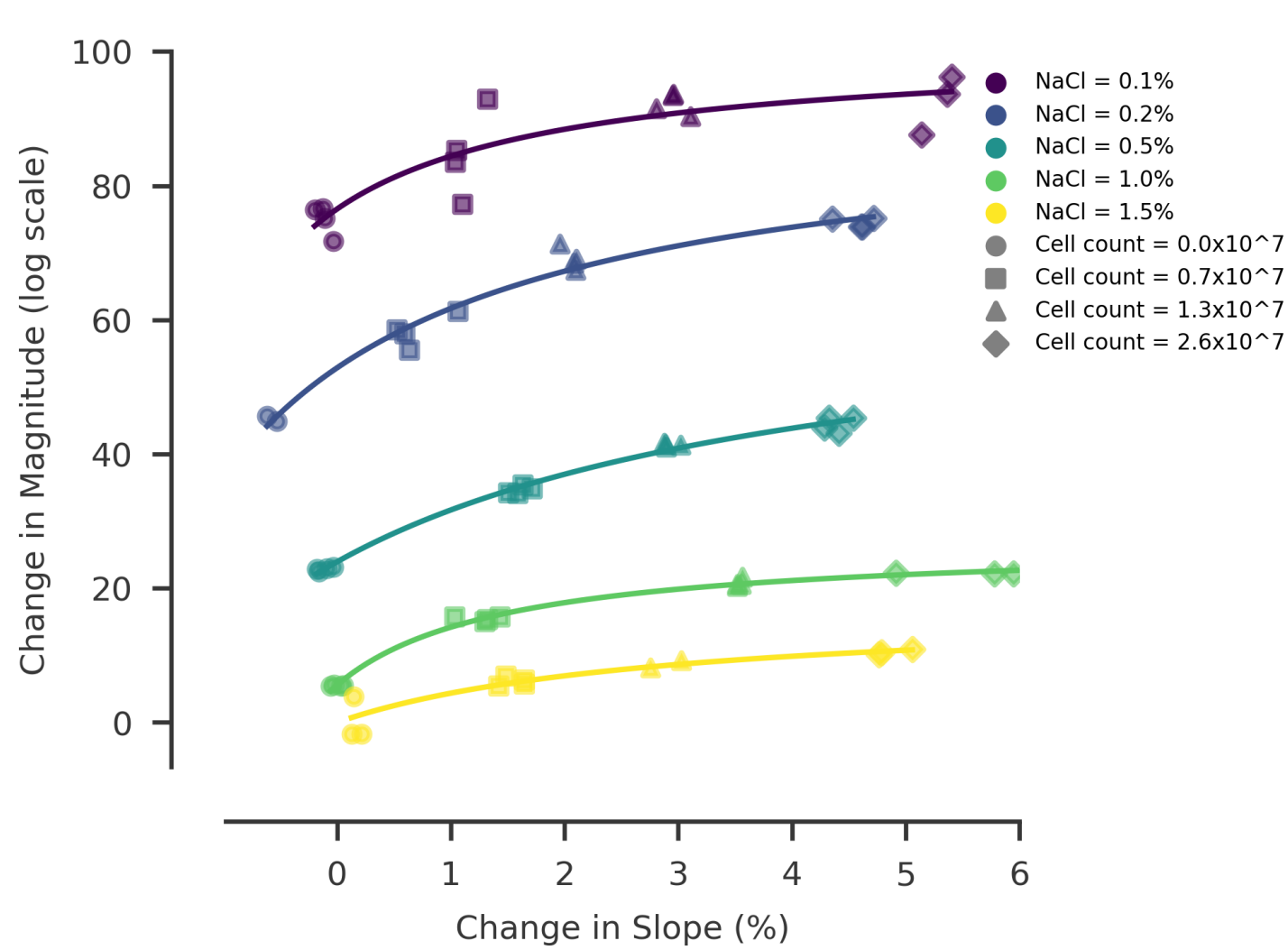
## Aim

1. Multi-modal Thermal and Impedance sensing
2. Decoupling signals
3. Advanced bio applications

## Measurement Concept



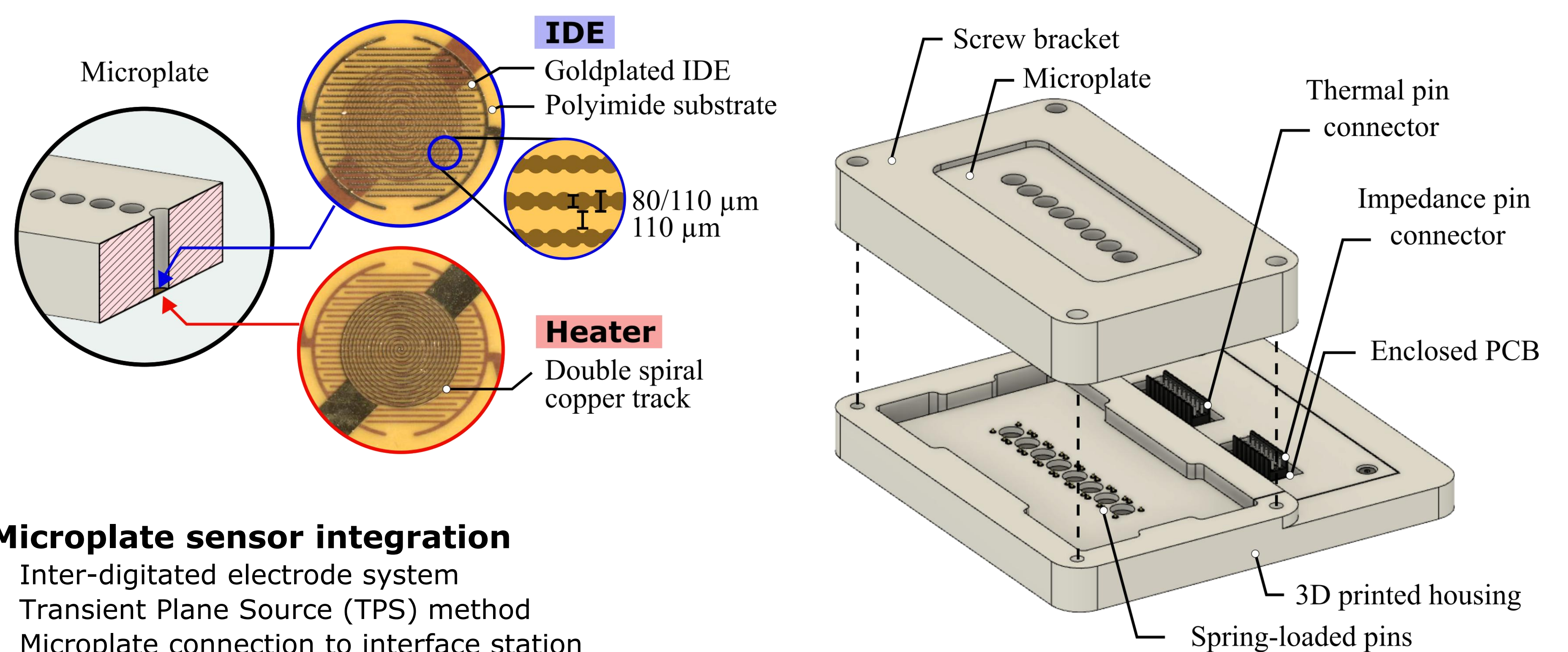
## Parameter mapping



### POC - Decoupling medium & cell count

- Mapping different properties
- X-axis: thermal / Y-axis: impedance
- Prediction using inverse distance weighting

## Microplate Sensing Setup



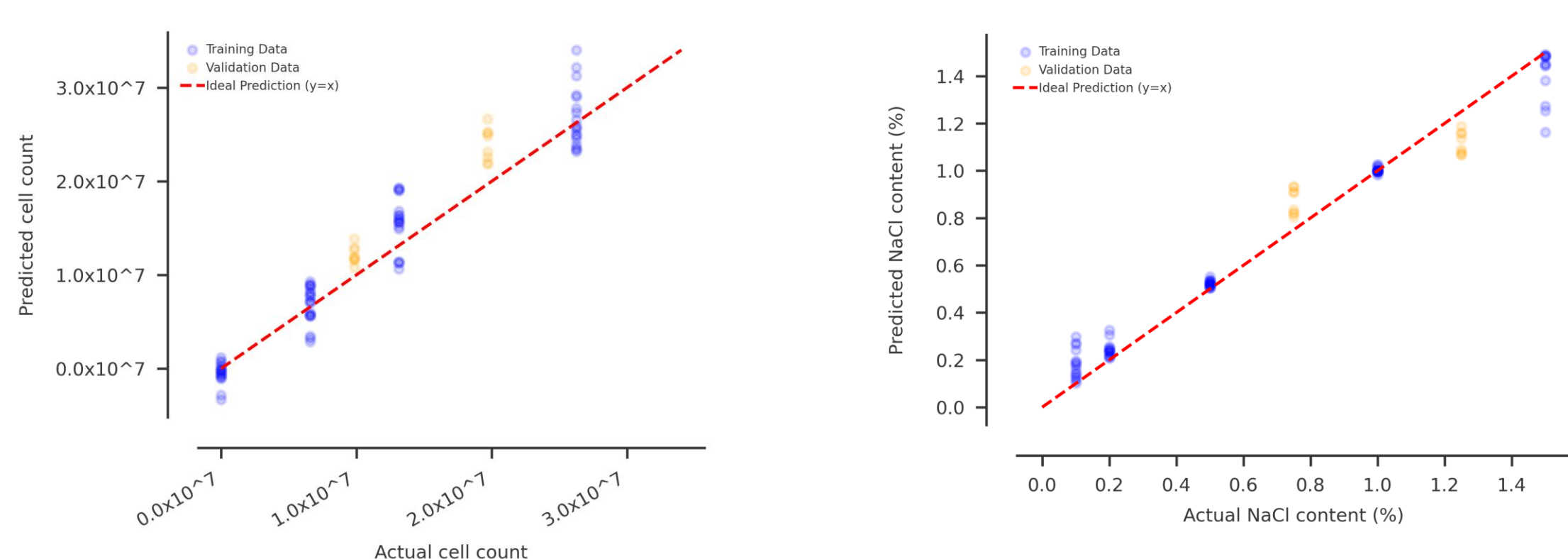
### Microplate sensor integration

- Inter-digitated electrode system
- Transient Plane Source (TPS) method
- Microplate connection to interface station

## Independent Prediction Model

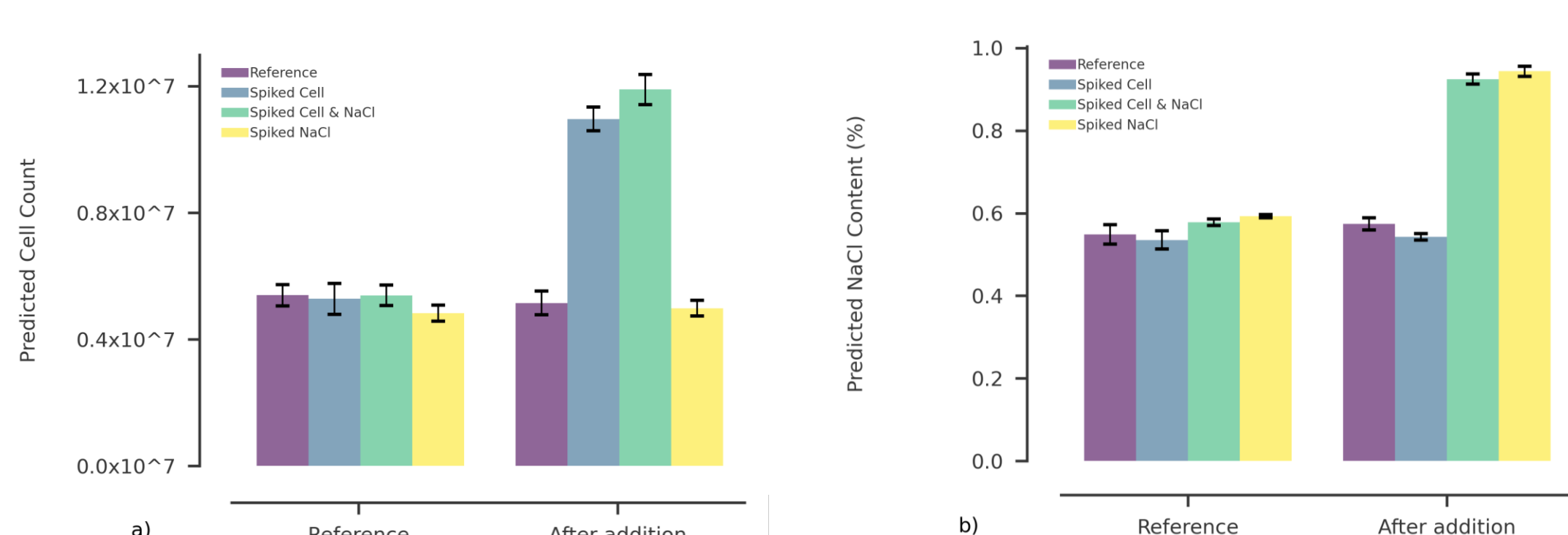
### Decoupling conductivity and Cell count

- Cell count – Thermal data
- Medium conductivity – Combined dataset
- Inverse distance weighting (IDW)



### Real time measurement – Spiking protocol

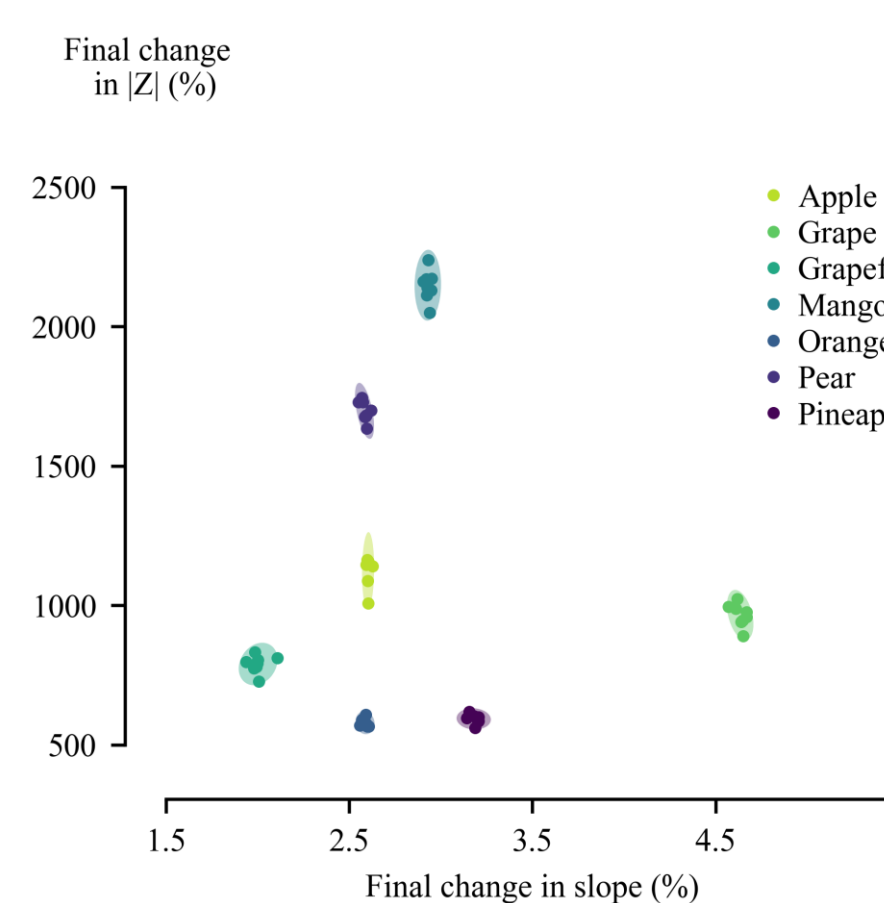
- Independent measurement of NaCl & cell count
- Real-time dynamic analysis
- No interference observed



## Explored Application

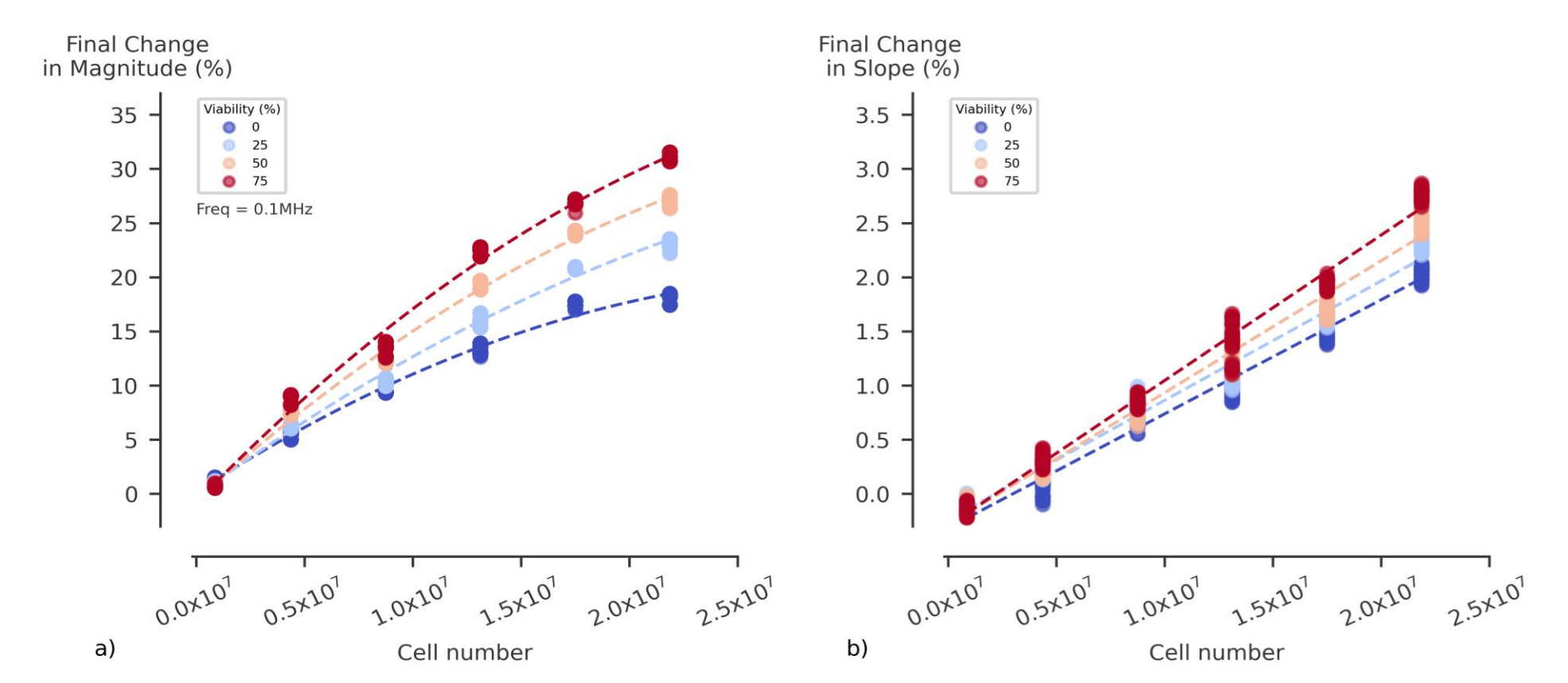
### Liquid Identification

Goossens et al. 2022 IEEE Sensors  
Identification of liquids through a use of combined measurement data



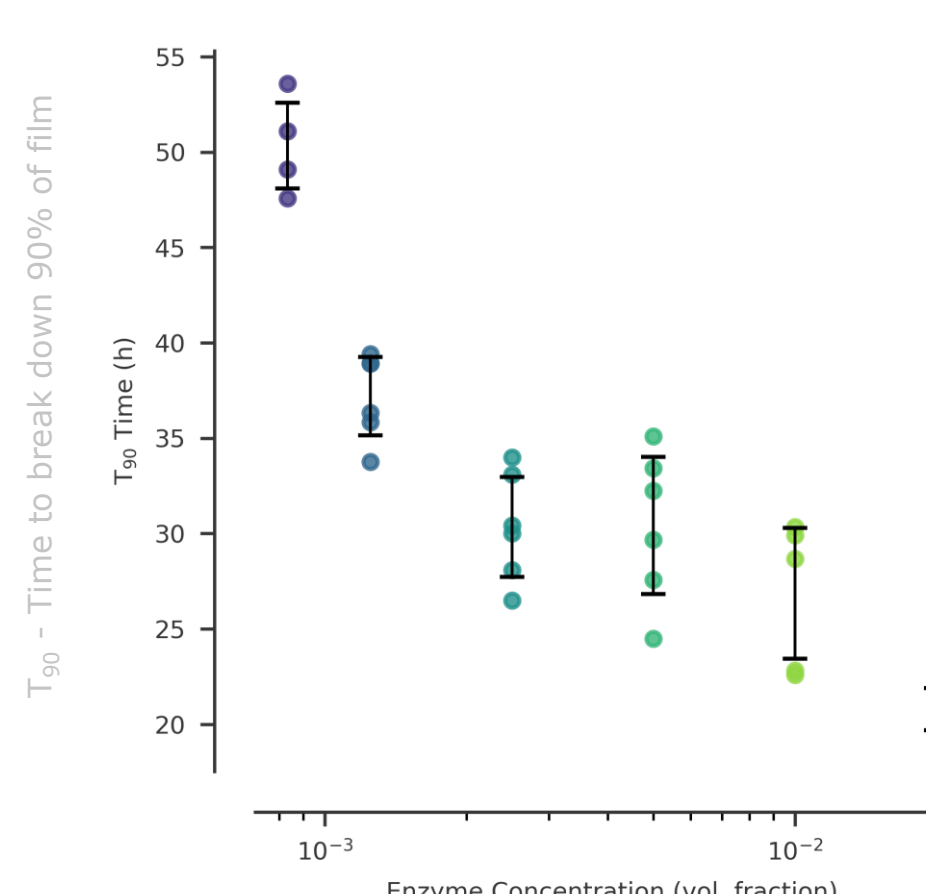
### Cell Viability & Cell Count

Goossens et al. 2025 Talanta  
Prediction of cell count & viability state independently through signal decoupling



### Polymer Film Degradation

In Review  
Monitoring the polymer film thickness during the enzymatic degradation process



### Hydrogel Polymerisation

In Progress  
Thermal actuate thermal-responsive hydrogels and monitor the occurrence of phase transition

