Point-of-Need Diagnostics - Game Changer in Future Healthcare?

Silvia Schobesberger

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Where is a point-of-need for diagnostic?

Healthcare
- Disease outbreak
- Blood glucose

Veterinary Medicine
- Infections
- Parasites

Forensics
- Drugs
- Prescence of blood

Food Safety
- Mycotoxin
- Allergens

Professional Sports
- Doping
- Lactate



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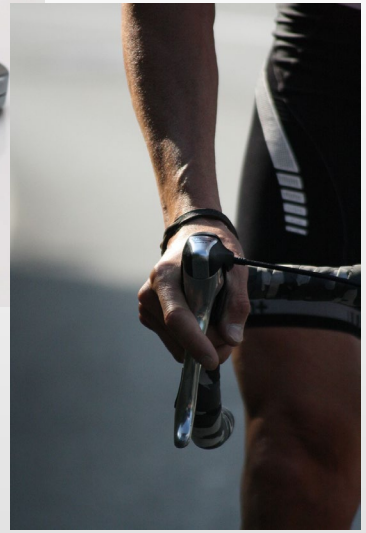

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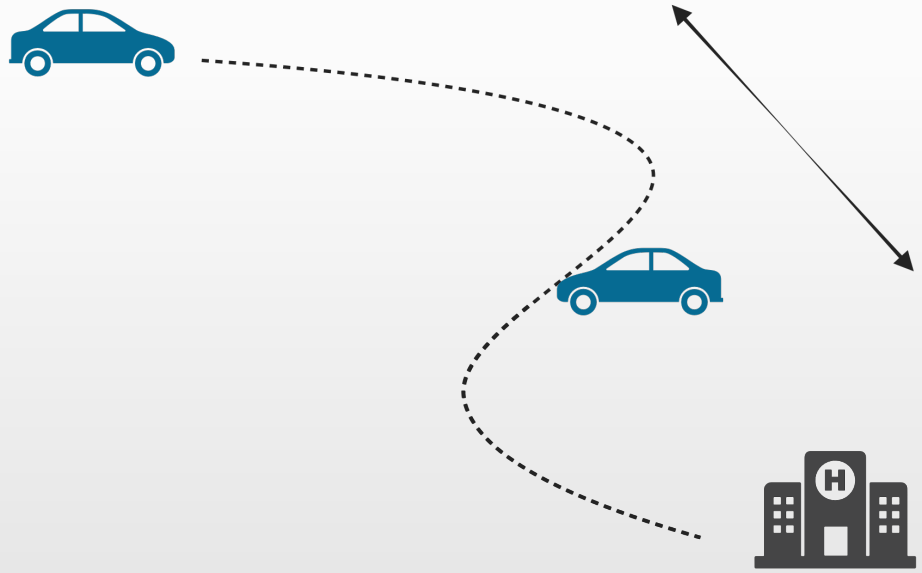
Future Healthcare

Challenges of healthcare system

- Das Verwaisen der Landarztpraxen im weiten Land
  (Gudrun Springer, 20.01.2023, Der Standard)
- Regierung will Zahl der Primärversogungszentren bis 2025 verdreifachen
  (APA, 02.03.2023, Der Standard)

Increase of primary care

- Integrate on-site diagnostic
- Employment of rapid tests
- Accurate diagnosis
- Discuss medical report at the same day



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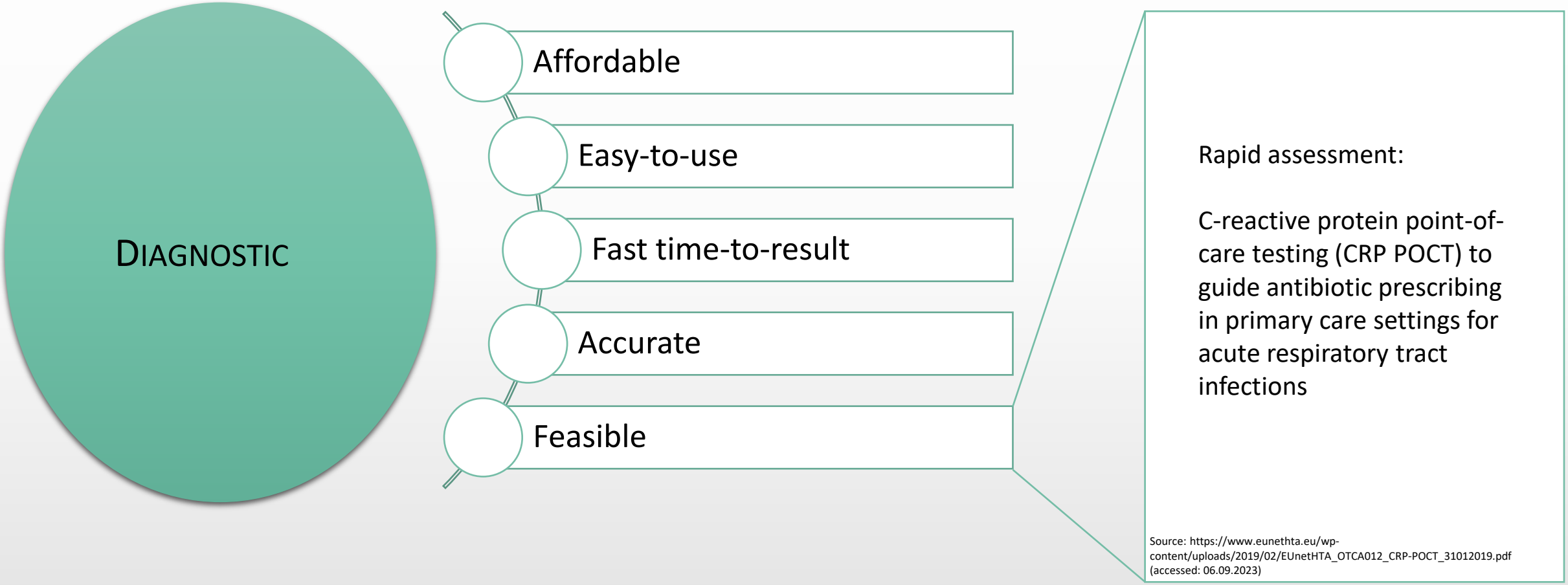
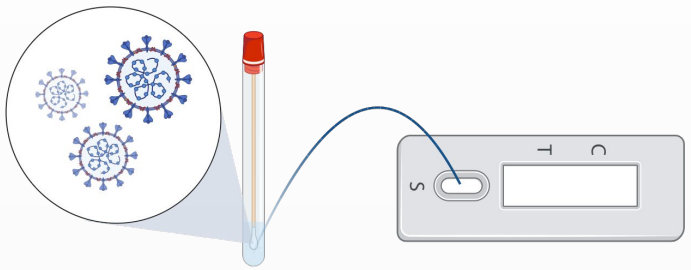
Requirements of Diagnostic Devices

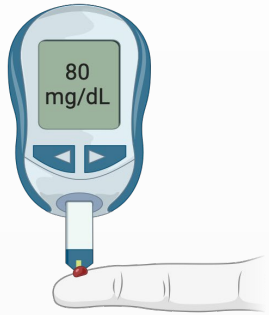


Examples of Diagnostic Devices

Lateral Flow Assays



Biosensors



Reader-dependent Systems



Biofunctionalization

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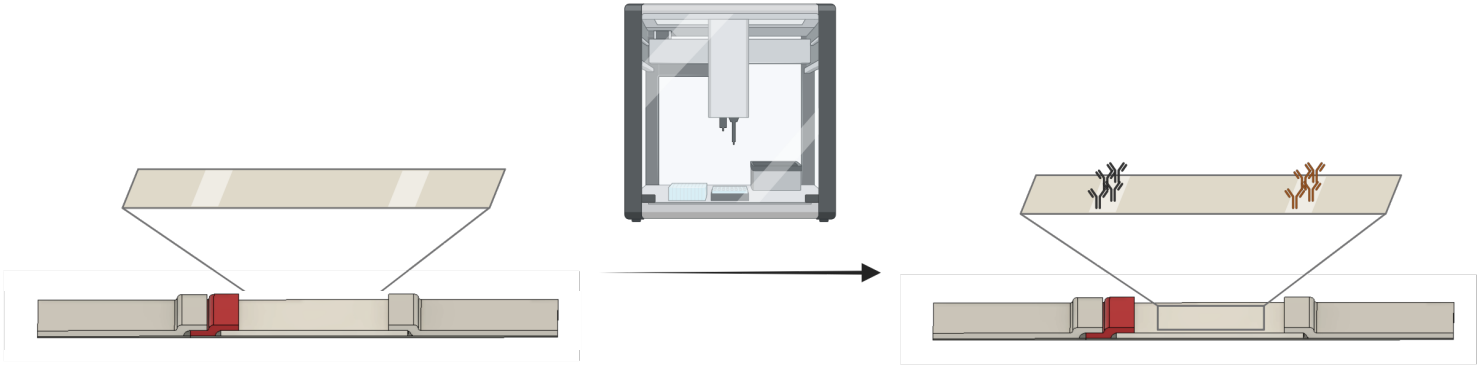
Biofunctionalization

Functionalization of nitrocellulose membrane





- Control and test line positioning
- Assay sensitivity

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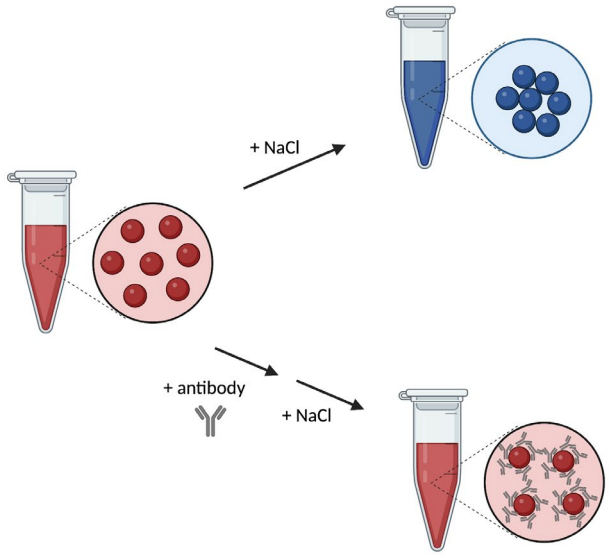
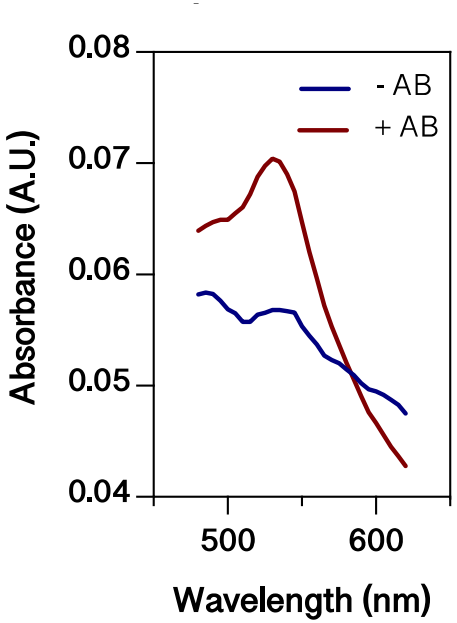
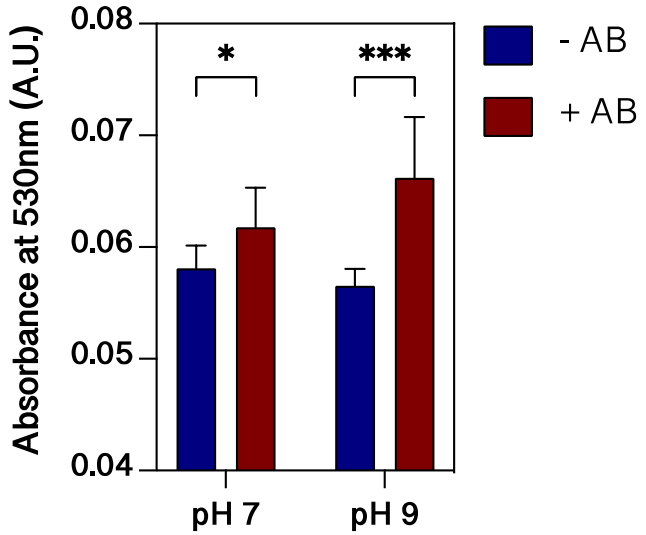
Biofunctionalization

Functionalization of gold nanoparticles







- Adsorption to gold surface
- Control functionalization by investigating aggregation

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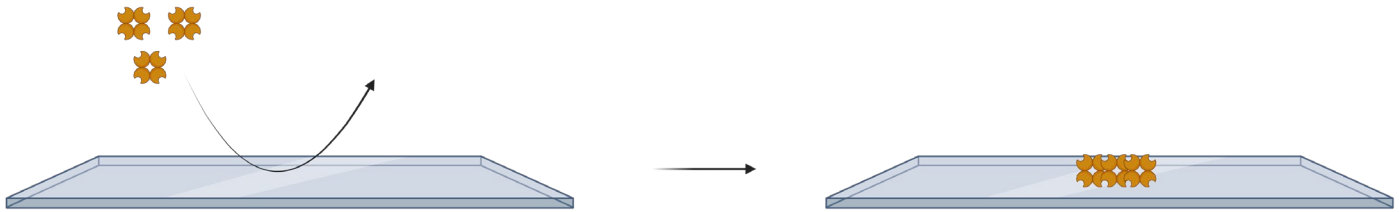
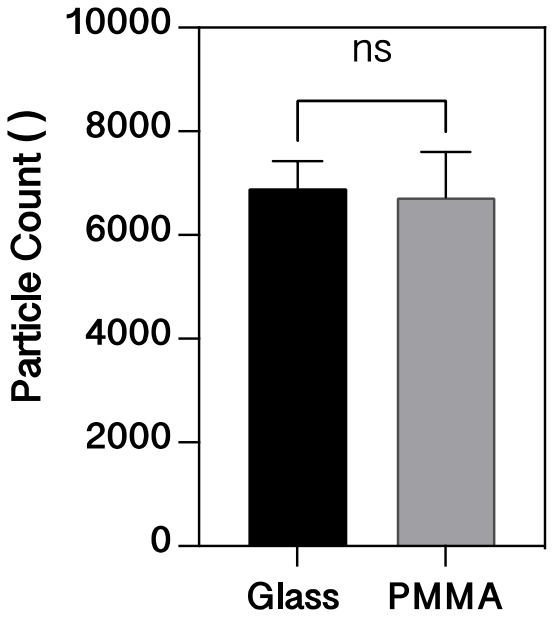
Biofunctionalization

Functionalization of surfaces





Streptavidin

- *Streptomyces avidinii*
- High affinity to biotin
- Tetramer

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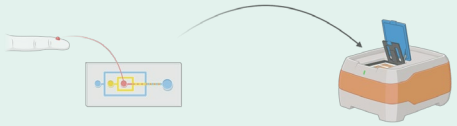
Biofunctionalization



Functionalization of surfaces



Passive adsorption (-)

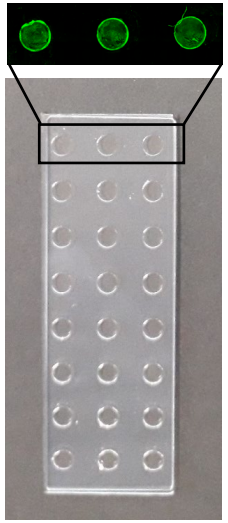


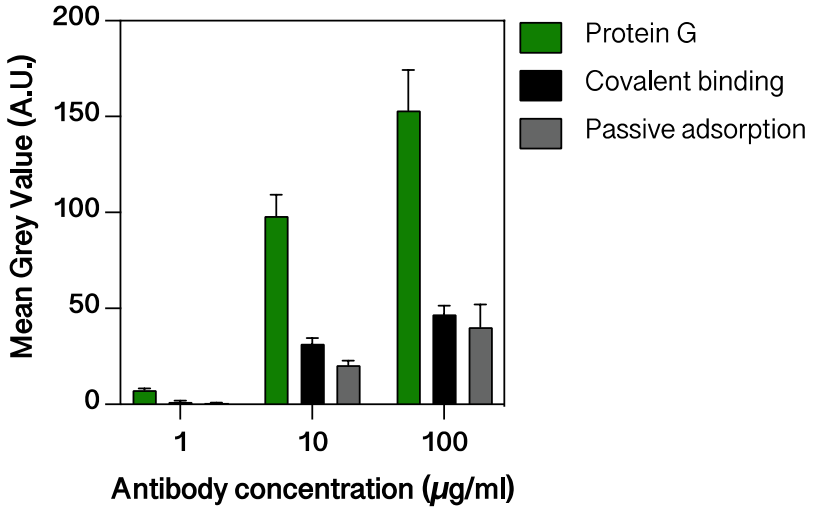
Covalent binding (3-MPS, GMBS)



Protein G (3-MPS, GMBS, Protein G)

- Different immobilization strategies
- Surface coverage
- Effect on sensitivity





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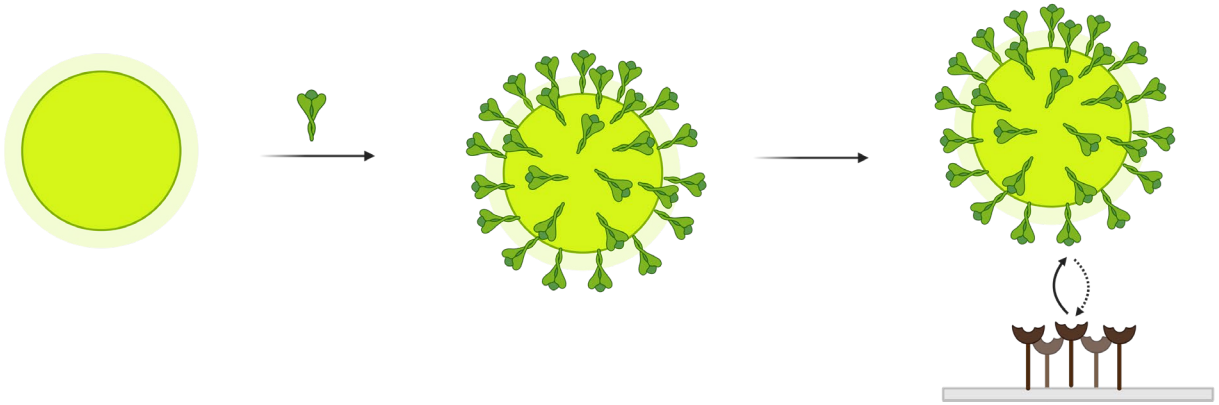
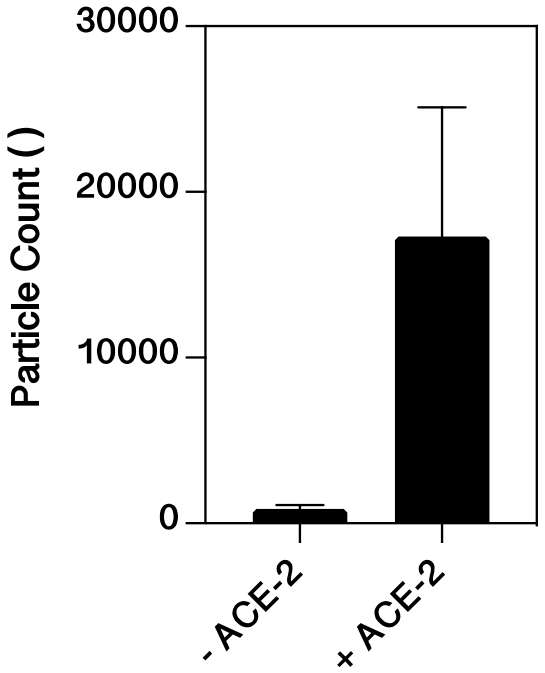
Biofunctionalization

Functionalization of fluroescent beads

- Polystyrene microspheres
- Surface modification (sulfate, amine, ..)





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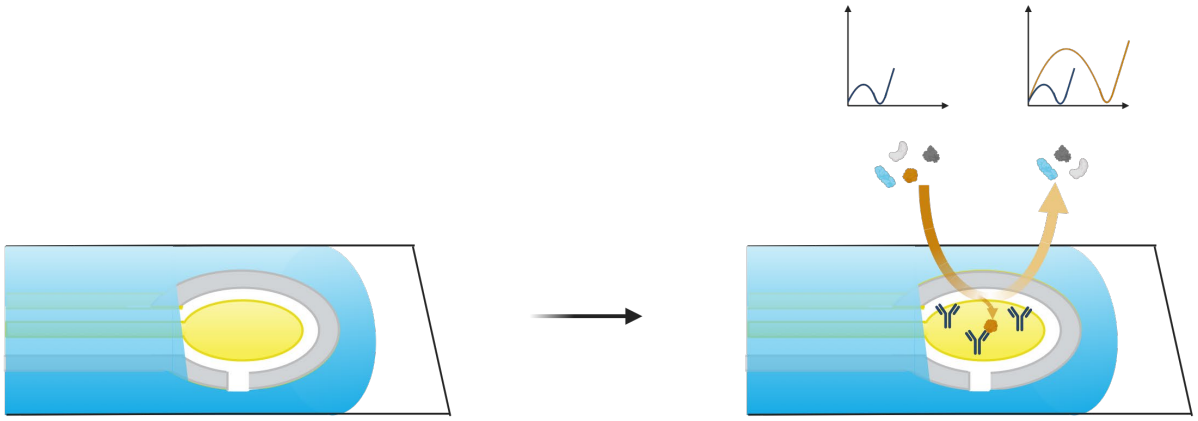
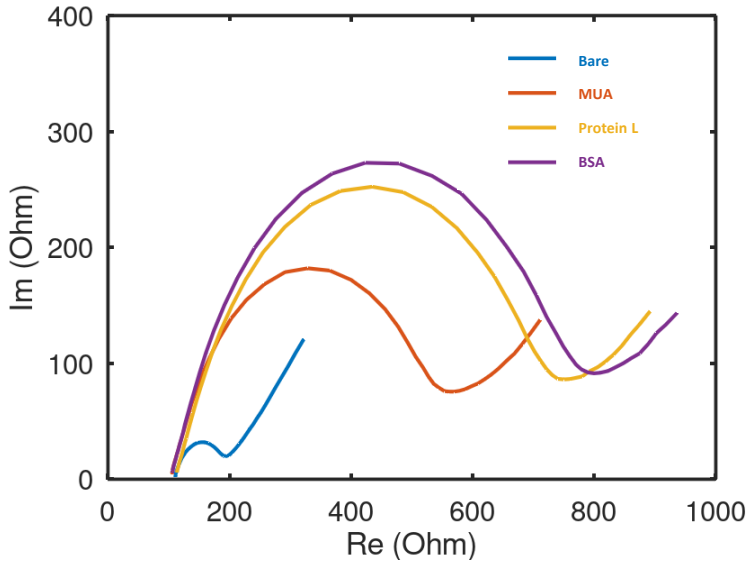
Biofunctionalization

Functionalization of biosenors

- Electrode surface
- Biorecognition element
- Electrochemical detection





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Summary

- Variety of point-of-need applications
- Increase of rapid diagnostic in primary care?
- Biofunctionalization plays key role
- Continuous optimization of biofunctionalization

THANK YOU FOR YOUR ATTENTION !

Special Thanks:
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