Minimizing Signal Interference from the Biological Sample Matrix in a Biosensor for Sepsis: the Pivotal Role of Water

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Fouling: a Ubiquitous Phenomenon

Definition: undesirable adsorption of species on surfaces from surrounding environment

Protein Adsorption: a Plague in Biotechnology

Biomedical concern for in vivo biomaterial applications: 'Foreign body reaction'

Bioanalytical concern in biosensor technology: 'Non-specific adsorption'

Antifouling Mechanism: Pivotal Role of Water

Molecular dynamics simulations

Neutron reflectometry

Two distinct hydration patterns (not to scale)

Antifouling surface chemistry

Ultra-high frequency acoustic wave sensing

Sepsis: Overview and Pathogenesis

LPS Biosensor Assay: Dose-Response Curve

Concentration (ng/L)

Conclusion

Successful preliminary research towards a new biosensor assay alternative for Sepsis capable of detecting bacterial endotoxin in full human blood plasma

Endotoxin detection: strategy and working principle

Polymyxin B (PMB): Antibiotic

Dysregulated host factors release with bacterial death

Antibacterial host response curve

Delta ~20 Å

Protein adsorption: a plague in biotechnology

Minimizing signal interference from the biological matrix

Antifouling behaviour against full serum

The frequency shift due to the adsorption of serum species was substantially reduced upon surface modification of quartz (Δf ≈ −31 kHz) with antifouling MEG-OH coating (Δf ≈ −3 kHz)

Sample matrix in a biosensor for sepsis:

Step I: Sample

Step II: Detection

DEMO Biosensor

Water essential to minimize signal interference from biological matrix

LASIK

LIP</body>