

FUNCTIONALISED LIPID BILAYER FOR SPECIFIC PROTEIN INTERACTION STUDIES

INTRODUCTION

When creating biofunctional structures on a solid support, biomolecules need to be kept in their native state in order to maintain their function. Also important is the specificity of the interaction between macromolecules and the functionalised surface. Consequently, a key objective is to control the deposition and immobilisation of biomolecules.

The QCM-D technique provides means to monitor the deposition of molecules under physiological conditions. Molecular interactions and kinetics can be characterised and conformational changes can be followed.

RESULTS

In this example, lipids form supported membranes by support-induced spreading of lipid vesicles, forming a fluid two-dimensional system. In addition, to prevent non-specific adsorption of proteins to a solid surface, the use of functionalised lipids, here Ni-NTA, allows specific adsorption of proteins, here snake α -toxin modified with a poly-histidine extension, in a close to native state. Functionality of the toxin is demonstrated by subsequent binding of native membrane fragments rich in acetylcholine receptor proteins as shown in **Figure 1**.

CONCLUSIONS

By using an NTA/ Ni^{2+} doped lipid bilayer, different biomolecules can be immobilised in order to allow specific interaction with for example membrane proteins. QCM-D offers excellent control of such surface architectures since both mass and structural changes are measured simultaneously.

REFERENCES

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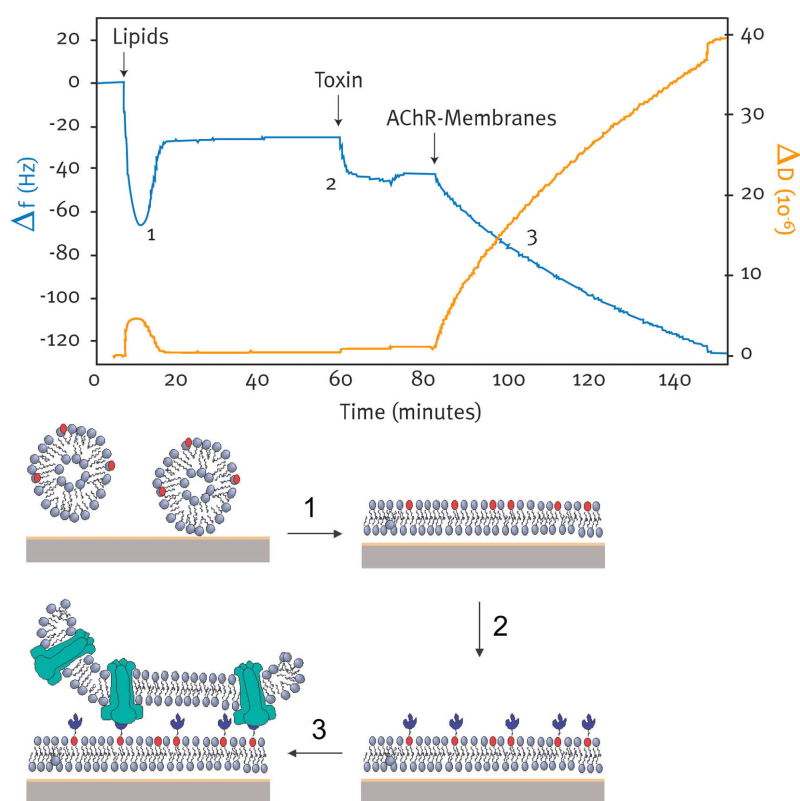


Figure 1 – Formation of a supported lipid bilayer (1), specific binding of α -toxin (2) and interaction of membrane fragments rich in acetylcholine receptor (3) were followed with the QCM-D technique. Adsorption of proteins and supramolecular assemblies, such as native membranes, are followed in real time. Clearly, the receptor membranes are binding and form a very flexible structure compared to the α -toxin layer as indicated by the high shift in Dissipation (ΔD).