LOW MOLECULAR WEIGHT SURFACTANT ADSORPTION TO A GOLD SURFACE

INTRODUCTION

This example illustrates that QCM-D is suitable for studies of surfactant adsorption. Two different surfactants were used:

1. Triton X100: non-ionic detergent with low CMC (0.24mM), Mw=625Da.
2. Octyl-b-d-glucoside (βOG): non-ionic detergent with high CMC (20..25mM), Mw=292Da

The buffer solution was 10mM TRIS, pH 8.0, 100mM NaCl.

The sensor crystal with a gold surface was treated with UVO (ozone generating UV light) prior to the measurement, mounted in the QCM-D chamber and the chamber was filled with buffer solution. The gold surface was then exposed to a triton X100v solution (0.24mM) and a βOG solution (20mM), respectively, followed by several rinses with buffer.

RESULTS

The adsorption behaviour of surfactants on the gold surface can be followed in real time (**Figure 1**). The adsorption of Triton occurs faster than the subsequent adsorption of βOG.

Upon rinsing with buffer, a fraction of the bound surfactant is desorbed. However, considerable amounts remain on the surface. Total shifts in frequency (f) of –5 Hz and -8 Hz (at 15MHz) for triton and βOG, respectively, are measured after two rinses. According to the Sauerbrey approximation, this corresponds to an adsorbed effective mass (including coupled water) of 90 ng/cm^2 for triton and 140 ng/cm^2 for βOG.

The total shifts in dissipation (D) of 0.15×10^{-6} and 0.8×10^{-6} (at 15 MHz) for triton and βOG respectively indicate that the adsorption of βOG is resulting in a less rigid film (likely to have a considerable amount of coupled water) than that obtained with triton.

CONCLUSIONS

This application note shows that QCM-D can detect adsorption of small molecules with Mw < 1000 Da. The binding rate, mass and structural properties of formed molecular layers are obtained quickly and easy.

REFERENCES

Measurements conducted by Dr R. Richter & Professor A. Brisson in 2001 at the Department of Biophysical Chemistry, University of Groningen, the Netherlands.

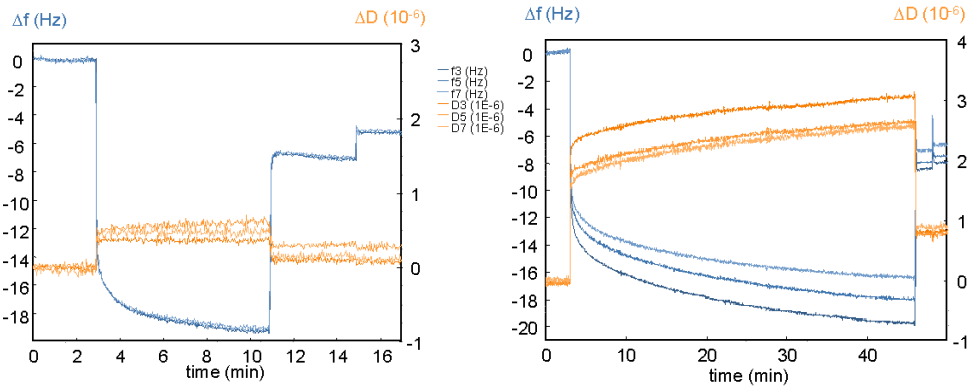

Figure 1 *– The left panel shows the frequency and dissipation responses for the adsorption of triton X100, while the right panel shows the responses for the adsorption of* βOG *detergent. The frequency responses indicate that the* βOG *forms a somewhat thicker and much softer layer than the triton X100. Also the binding rate is different, saturation takes place quicker for the triton X100, even if the concentration was much lower.*

Headquarters: Q-Sense AB, Redegatan 13, SE-426 77 Västra Frölunda, Sweden, Phone +46 31 769 769 0, Fax +46 31 69 80 40, info@q-sense.com
North America: Q-Sense Inc, +1 (949) 250 0273, sales@q-sense.com **Scandinavia:** Q-Sense AB, +46 31 769 769 0, sales@q-sense.com
UK/IE: Scientific & Medical Products Ltd, +44 161 491 3068, scimed@dircon.co.uk **Germany/CH/AT:** LOT-Oriel GmbH, +49 6151/8806-44, qsense@lot-oriel.de **France:** LOT-Oriel FR, +33 1 6919 4949, tcherbak@lot-oriel.fr **Italy:** LOT-Oriel IT, +39 2 26822104, doriano@lot-oriel.it
Benelux: LOT-Oriel Benelux, +31 10 2859 511, benelux@lot-oriel.com **Japan:** Meiwafosis Co Ltd, + 81 3 5379 0051, inuzuka@meiwanet.co.jp
Korea: DI Biotech Ltd, +82 2 511 4811, inform@dibiotech.com **Australia:** ATA Scientific Ltd, +61 2 9543 0477, enquiries@atascientific.com.au