Electronic Supplementary Material (ESI) for Sensors & Diagnostics.

Supporting Information

Influence of environmental vibration on the performance and accuracy of the QCM

To test the influence of environmental vibration, an empty QCM chip was assembled in the flow cell. We then placed the flow cell on top of a mobile phone and flushed it with PBS. After reaching stable resonance frequency, we turned on vibration of the mobile phone for several minutes in three consecutive cycles and recorded the QCM signal continuously. Fig. S1 shows the corresponding sensor signal.

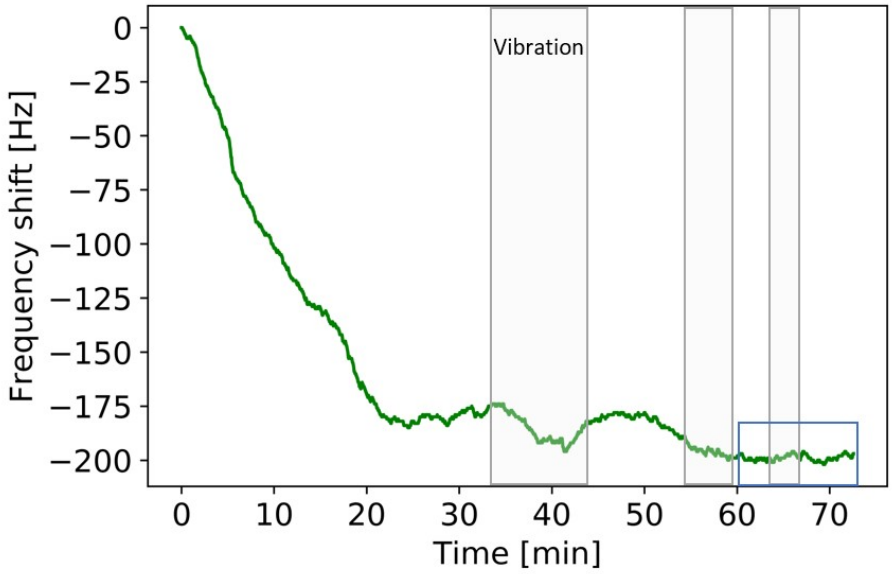

Fig. S1: Sensor signal of a QCM channel when exposing the measuring cell to three consecutive cycles of vibrations coming from a mobile phone. After reaching a stable baseline, vibrations do not influence the stability of the measurement (i.e. the third vibration cycle, highlighted with a blue rectangle).

A stable resonance frequency baseline is crucial to minimise disruptive influences. This is valid for vibration too: The first vibration cycle (i.e. after approx. 32 min) in Fig. S1 results in a baseline drift towards lower frequencies until drifting upwards again. In addition, frequency fluctuations are visible. The second cycle (i.e. after approx. 53 min) leads to significantly less influence after turning on vibration, indicating a baseline close to stability: the drift tendency does not change when turning on vibration. This indicates that the sensor reaches baseline stability independent of vibration. One can conclude that the QCM channel reaches a stable resonance frequency after 60 min in this measurement, as the third vibration cycle does affect the frequency signal at all. Thus, vibration does not influence QCM performance, when that reaches stable baseline, which is the necessary prerequisite for all measurements, anyway.

Fig. S2 shows a small portion of the time-dependent signal zoomed into the third vibration cycle of the measurement (i.e. the area marked by a blue square in Fig. S1). One can clearly see that switching vibration on and off does not significantly influence QCM signal. Frequency fluctuations are in the same range throughout the measurement.

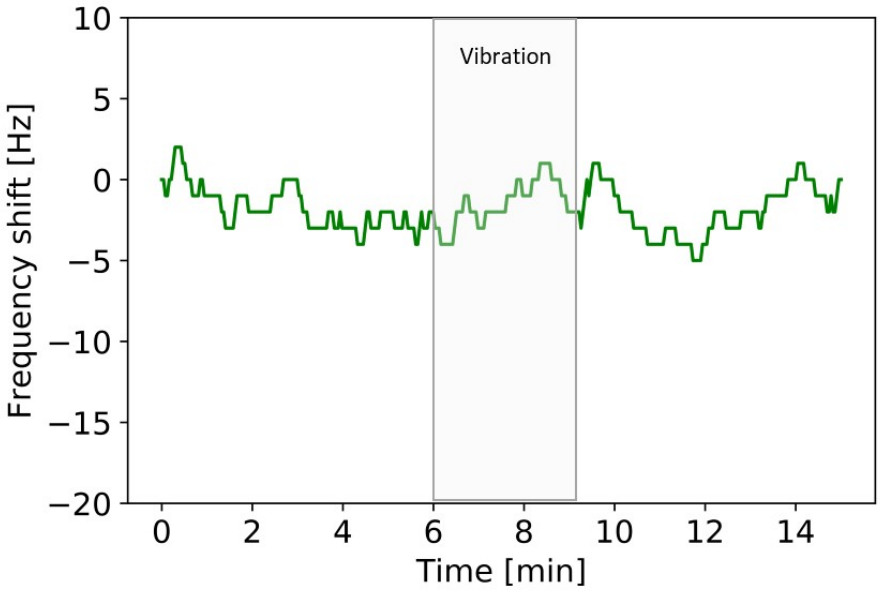

Fig. S2: After reaching a stable baseline, vibration does not significantly influence QCM signal and performance. Signal fluctuation and baseline drift are minimal and in the same range as without vibration.