

# Combined Scanning Electrochemical/Optical Microscopy With Shear Force and Current Feedback

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[Supporting Information]

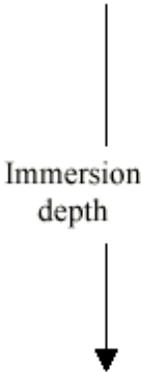
**SI Table 1. Resonance frequency and Q-factor of a 32.768 kHz tuning fork depending on tip immersion depth into solution**

|   | <b>Resonance Frequency</b> | <b>Q-factor</b> |
|---|----------------------------|-----------------|
| <b>Bare tuning fork</b>                         | ~ 32 kHz                   | ~ 450           |
| <b>With a tip in air</b>                        | 30 ~ 31.5 kHz              | 40 ~ 50         |
| <b>Only a tip in solution</b>                   | 30 ~ 31.5 kHz              | 40 ~ 50         |
| <b>Both a tip and a tuning fork in solution</b> | No obvious resonance peak  | N/A             |

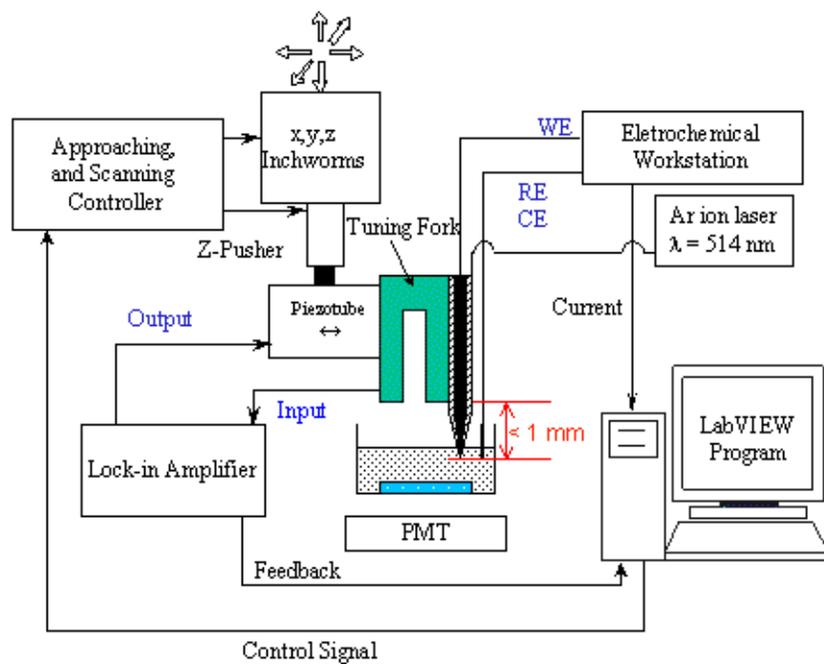
[Supporting Information]

**SI Table 2 Resonance frequency and Q-factor of a 100 kHz tuning fork depending on tip immersion depth into solution**

|   | <b>Resonance Frequency</b> | <b>Q-factor</b> |
|---|----------------------------|-----------------|
| <b>With a Tip in Air</b>                            | 95.337 kHz                 | ~ 400           |
| <b>Only a Tip in Solution</b>                       | ~ 95.3 kHz                 | 360 ~ 400       |
| <b>Both a Tip and a<br/>Tuning-fork in Solution</b> | No obvious resonance peak  |                 |
|   | 91.4 kHz                   | 46.4            |
|   | 89.5 kHz                   | 36.5            |
|   | 89.4 kHz                   | 49.8            |
|   | 86.7 kHz                   | 45.8            |
|   | 86.3 kHz                   | 35.3            |
|   | 85.5 kHz                   | 45.1            |

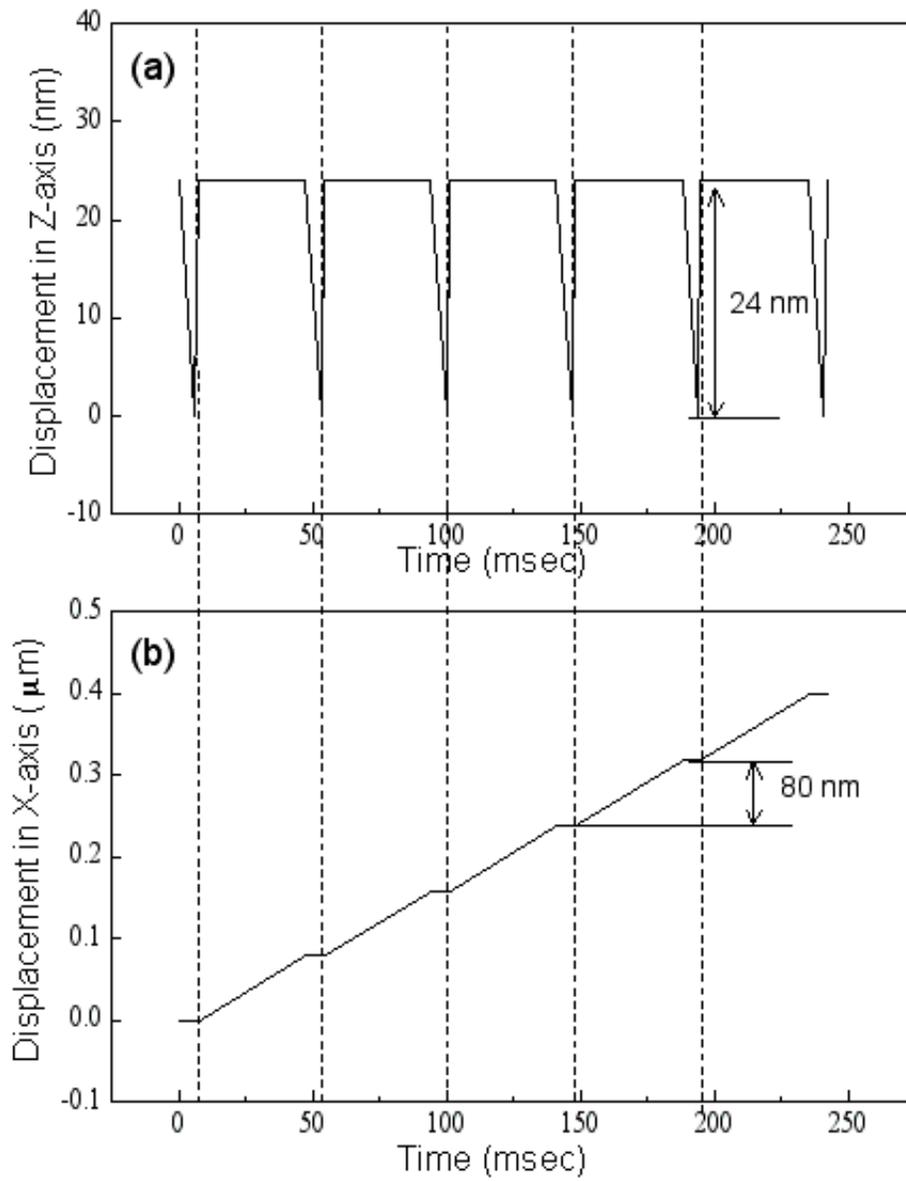


[Supporting Information]



**SI Figure 1.** Schematic of instrumental setup for SECM/OM with shear force detection using a tuning fork.

[Supporting Information]



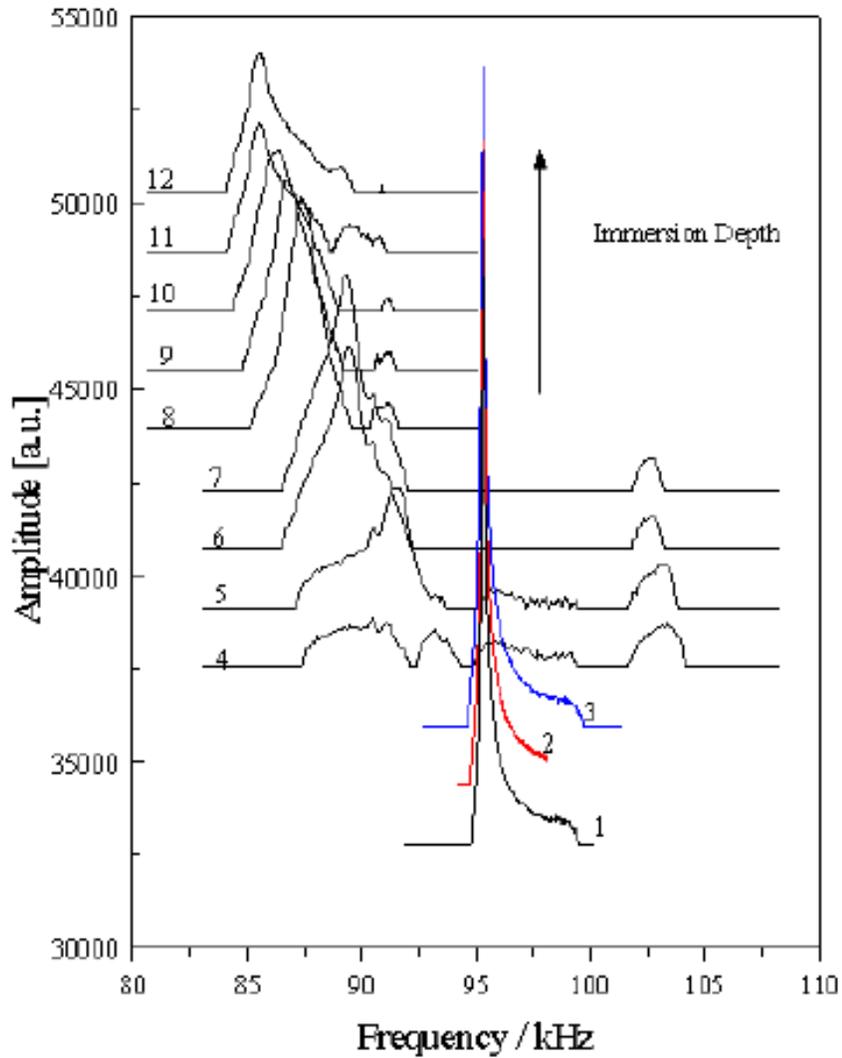
**SI Figure 2.** Tip displacement in (a) z- and (b) x-direction as a function of scanning time. All signal measurements were taken at the time indicated by dotted line.

[Supporting Information]



**SI Figure 3.** Optical microscope image of fresh water diatoms, *Navicula minima*.

[Supporting Information]



**SI Figure 4.** Tuning fork amplitude signal as a function of frequency for increasing immersion depths. Line 1: both a tuning fork and the attached tip are in the air; Line 2 and 3: only the tip immersed in water.