

Continuous dielectric measurement system for monitoring cell-shape dynamics in the flagellate *Euglena gracilis*

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SUMMARY

Dielectric monitoring is a non-invasive technique that can characterize the passive electrical properties of biological cells and tissues. The present study was undertaken to examine whether dielectric measurements can be used to report on cell-shape dynamics in real time in the flagellate *Euglena gracilis*. *Euglena* cells were subjected to alternating conditions (control 'rod-shaped' and mechanically-induced 'spherical-shaped'), and the cell suspensions (volume fraction, 6%) were allowed to flow through an impedance-measurement cell. Data acquisition was completed within 0.3 s for each frequency point. When examined over the range 1 kHz to 100 MHz, low-frequency relative permittivity was found to be a suitable measure of *Euglena* cell-shape change. The relative permittivity at 10 kHz stayed at ~3000 for the rod-shaped cell suspension, but it declined to ~2000 for the spherical-shaped one. The electrical method presented here appears to be applicable for describing cell-shape dynamics in real time.