Single-cell analysis with rolled-up tomography devices

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Rolled-up nanotechnology[1] is a valuable tool for the fabrication of micro-scale biosensors. Here, we present a microtube device with ca. 30 µm diameter and integrated electrodes for single-cell electrical impedance tomography (EIT), i.e. AC current injection to obtain spatially resolved information about the conductivity distribution.[2]

A single HeLa cell was introduced into the sensor and observed over time. A decrease in conductivity was detected (Figure 1), which was correlated to the uptake of low-conductivity medium (0.01X PBS) during necrotic cell death. This underlines the device's capabilities for label-free single cell sensing, which is suitable e.g. for drug screening and biocompatibility studies.

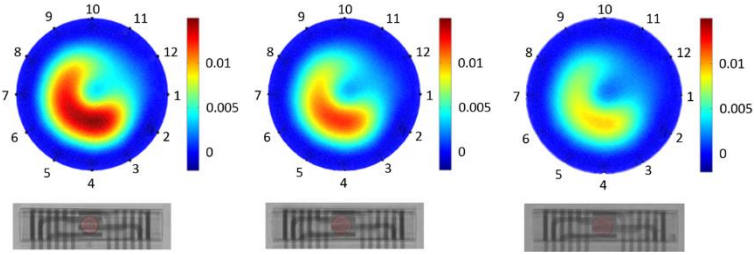

Figure 1: Optical microscopy images and EIT images of a single HeLa cell during necrosis, from left to right at t=0h, t=1h, t=3h.

REFERENCES:

1. Schmidt, O. G. & Eberl, K. Nanotechnology. Thin solid films roll up into nanotubes. *Nature* **410,** 168 (2001).
2. Barber, C. C., Brown, B. H. & Freeston, I. L. Imaging spatial distributions of resisitivity using applied potential tomography. *Electron. Lett.* **19,** 93–95 (1983).