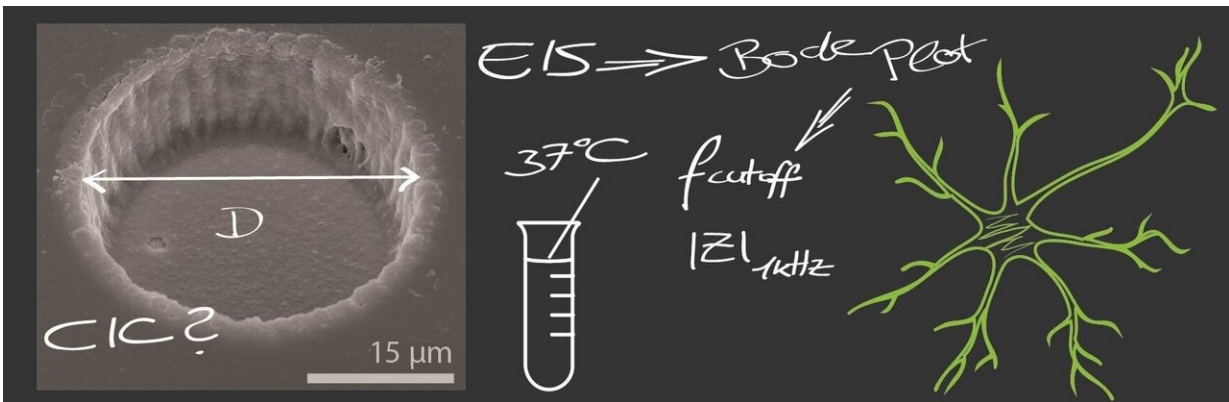


# Researchers develop guidelines to standardize analysis of electrodes

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Analysis of characteristics of a microelectrode for receipt of electrical nerve cell signals at body temperature, photographed using a scanning electron microscope (left). Credit: Maria Asplund

How can scientists measure and define the performance of neural electrodes if there are no uniform standards? Freiburg microsystems engineer Dr. Maria Asplund together with Dr. Christian Böhler and Prof. Dr. Thomas Stieglitz, as well as Prof. Dr. Luciano Fadiga and Dr. Stefano Carli from the Italian Institute of Technology at the University of Ferrara, Italy, have developed guidelines to standardize the testing of the performance of electrodes for neural interfaces and bioelectronic systems. The researchers have published their tutorial in *Nature Protocols*.

Implantable neural [interface](#) extensions increase opportunities for neuroscientists to study the [nervous system](#) including the brain, and to develop potential treatments for diseases such as epilepsy and multiple sclerosis as well as for neurological disorders such as paralysis and loss of speech after stroke. This gives the electrodes a key role, as they form the physical interface between the technical system and the biological cells. Nevertheless there is currently no general agreement on how best to assess and compare electrodes in the laboratory, or how to estimate and predict their efficiency when receiving and stimulating electrical signals after implantation.

In their tutorial the researchers present and critically discuss the key performance tests for characterizing neural interface electrodes. They also explain how they interpret the tests and implement them in scientific procedures, and the limits on this.

"Without generally accepted performance tests it's difficult to evaluate the many proposals for [electrode](#) materials in the literature and to determine where we should focus efforts," Asplund explains. "We're proposing a uniform standard, in order to enable transparent reporting on electrode performance and promote an efficient scientific process. In the end we want to speed up implementation in clinical practice."

**More information:** Christian Boehler et al. Tutorial: guidelines for standardized performance tests for electrodes intended for neural interfaces and bioelectronics, *Nature Protocols* (2020). [DOI: 10.1038/s41596-020-0389-2](https://doi.org/10.1038/s41596-020-0389-2)

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