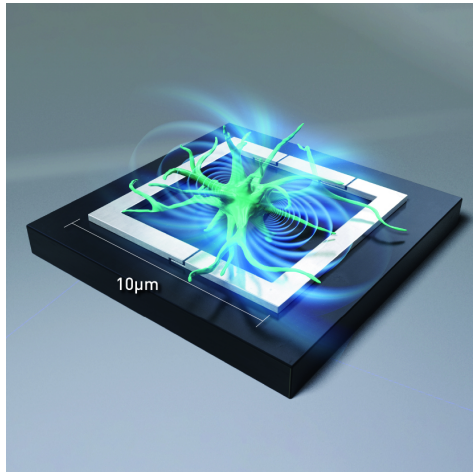


Detecting trace elements in neurons using a superconducting flux qubit



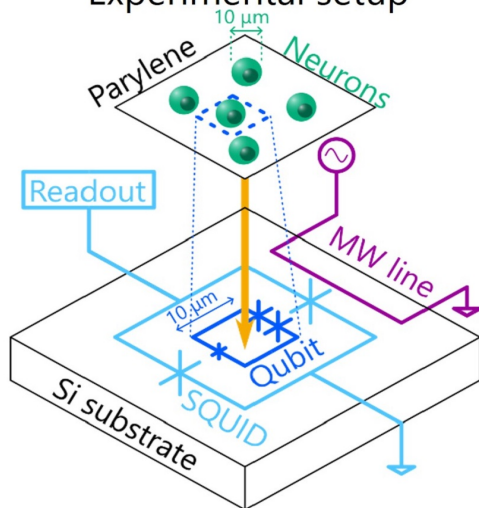
Background

Trace metal elements in the body, such as iron, play a vital role in physiology and pathology. Knowing the redox state of these elements is important for advancing our understanding of biological phenomena, but existing analysis has required the preparation of large numbers of samples.

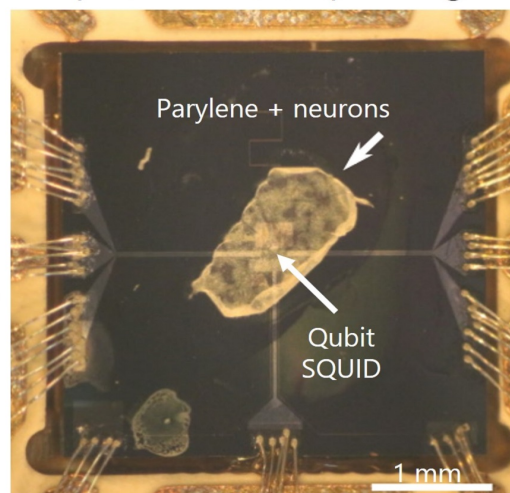
Summary

A highly sensitive micrometer-sized magnetometer using a superconducting flux qubit has been applied to biosensing and successfully detected and quantified ferric ions in neurons. Using the sensor, which is about the size of a cell, it is possible to make measurements at the level of a single cell.

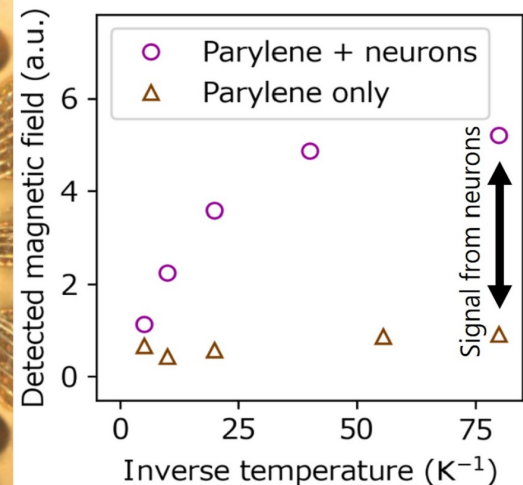
Experimental setup



Optical microscope image



Detection of ferric ions



Features

- A superconducting flux qubit is used as a magnetometer featuring high sensitivity and high spatial resolution
- Biocompatible parylene film, about a micrometer thick, is used as an insulating layer between the sample and the magnetometer
- Quantitative analysis of the number of metallic atoms in a sample is possible from the detected magnetometer signal intensity

Future_benefits

By developing our technology into the imaging of metallic ion distribution in cellular tissue, we will contribute to the realization of high-precision pathological examinations.

Collaboration partners

Shizuoka University

Exhibiting Company

NIPPON TELEGRAPH AND TELEPHONE CORPORATION

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