Color centers in diamond have emerged as a leading platform in the field of quantum sensing, broadly defined as the use of qubit systems to measure environmental parameters. In my lab, we harness the optical and spin properties of diamond color centers to image magnetic phenomena over a broad range of length scales. At the nanoscale, we build diamond magnetic microscopes to image, for example, the paramagnetic nanocrystals produced by malaria parasites. At the microscale, we embed diamond quantum sensors inside microfluidic chips to perform multidimensional nuclear magnetic resonance spectroscopy. At the millimeter scale, we use microstructured magnetic materials to make highly sensitive diamond magnetometers, with applications in medical imaging, navigation, and even dark matter detection. I will provide an overview of the field, discuss ongoing challenges, and outline future directions.

Suggested Reading:

Hosted by Professor Susumu Takahashi

The scientific community is invited