

## 1. Mission

- We will explore the frontiers of quantum-based technology and industry by integrating different research fields such as medicine, chemistry, materials, and informatics.
- In particular, we aim to develop a new quantum industry, focusing on quantum and chemistry.

## 2. Activities

### ① Base metal- and multimetallic-catalysts

**We develop base metal catalysts and multimetallic catalysts that lead to stable supply.**

- New base metal catalysts
- Multimetallic catalysts
- Precise orientation of atoms or molecules

### ② Luminescent probes using multiple elements

**We develop lightfastness dyes and next-generation quantum dots (QDs) using multiple elements.**

- New fluorophores showing lightfastness
- Next-generation QDs with low toxicity
- Control of optical properties using multi-element QDs

### ③ New techniques for bioimaging

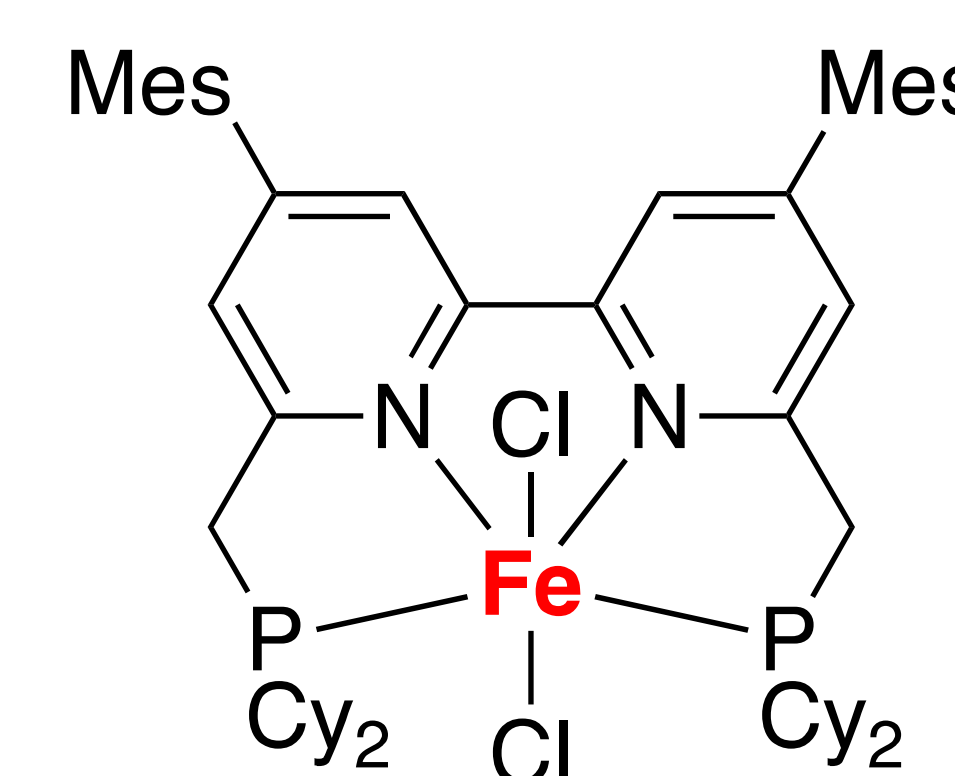
**Development of new methods for non-invasive biological imaging.**

- *In vivo* application of quantum-based materials
- Simultaneous detection of fluorescence and MR
- Improving the performance of holographic microscopy

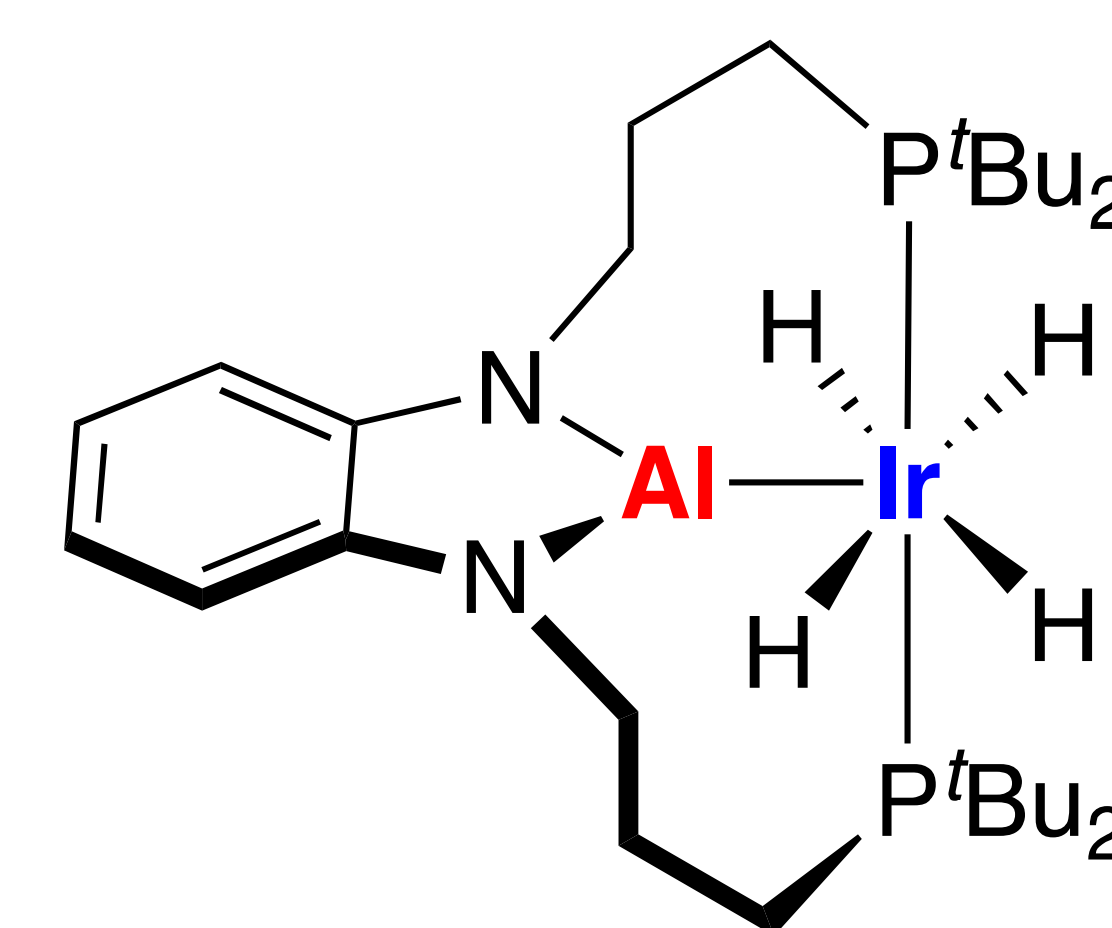
### ④ Next-generation MRI technology

**Hyperpolarized MR imaging for visualizing *in-vivo* functions and metabolism.**

- Dissolution Dynamic Nuclear Polarization (DNP)
- *In vivo* DNP
- Development of *in vivo* DNP MRI machine



Base metal catalyst



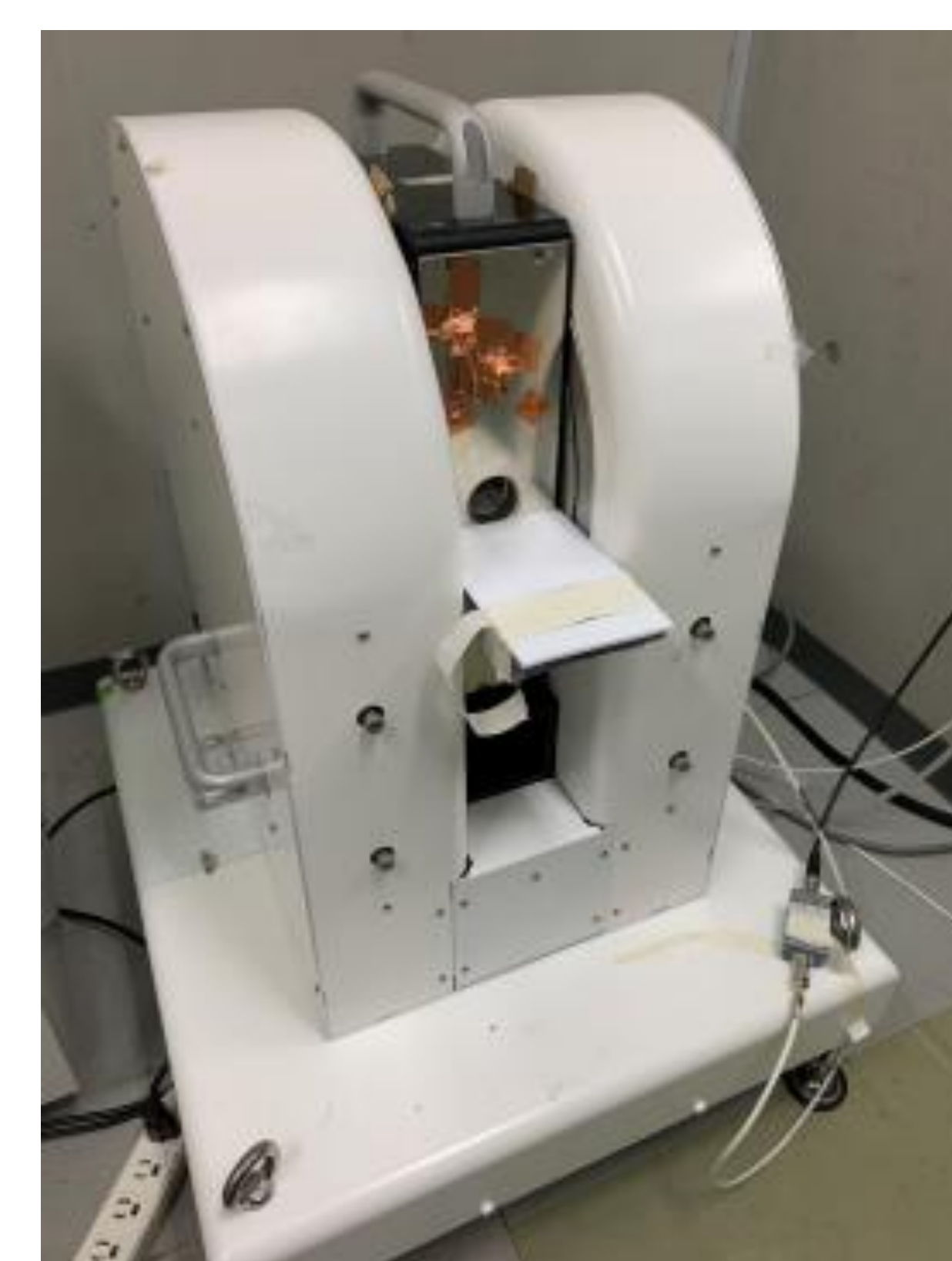
Multimetallic catalyst



Luminescence properties of multielement QDs



Holographic microscopy



*In vivo* DNP