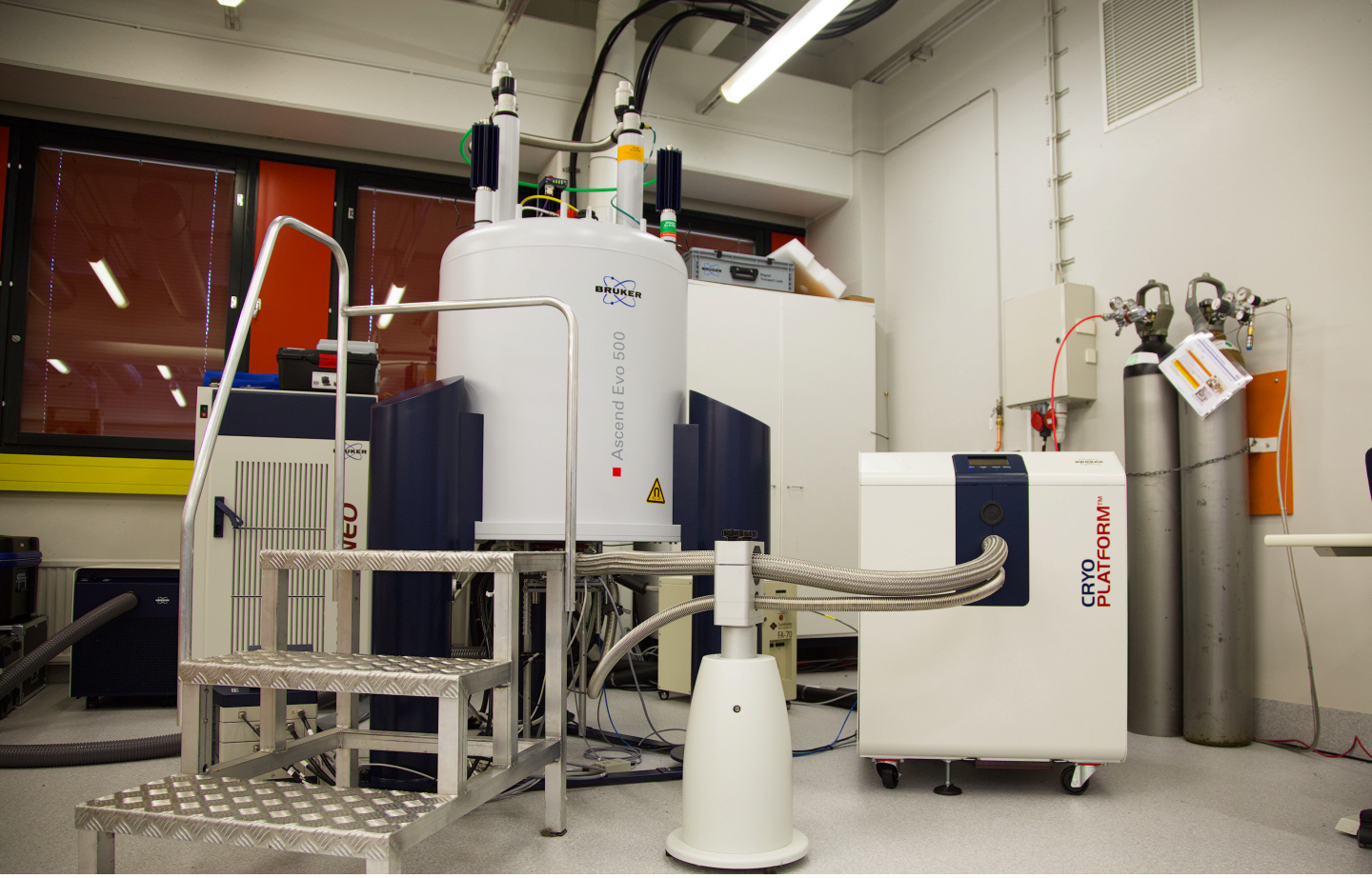

MR4GT

Magnetic resonance for green transition

Project homepage:
https://www.oulu.fi/en/projects/magnetic-resonance-for-green-transitition

Co-funded by the European Union

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COUNCIL OF OULU REGION

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Magnetic Resonance for Green Transition

The aim of the project is to create a state-of-the-art magnetic resonance research environment to support, in particular, the activities and development of the University of Oulu and the business sector in the Oulu region. The focus is on research and education aimed at promoting the green transition. To achieve this goal, a 400 MHz NMR spectrometer and suitable probes were acquired. The instrument became available for research and teaching in October 2025, and its planned service life is at least 10–15 years.

Nuclear magnetic resonance spectroscopy (NMR spectroscopy) is one of the most versatile methods in chemical analysis, and is widely applied also in fields such as physics, materials research, geology, and biomedical sciences. One of the best-known applications based on the NMR phenomenon is **magnetic resonance imaging (MRI)** used in hospitals, as it has revolutionized medical research.

The **MR4GT infrastructure**, which is part of the University of Oulu's **Centre for Material Analysis** (https://www.oulu.fi/en/research/researchinfrastructures/centre-for-material-analysis), serves research, education, and innovation. The aim is to develop new magnetic resonance (MR) techniques with unprecedented sensitivity, efficiency, and information content for molecular and materials research, and to apply them to promoting the green transition and lifelong health. MR methods are utilized in multidisciplinary research, development, and innovation related to the hydrogen economy, circular economy, battery materials, climate change, mining, biochemistry and medicine.

From the business sector the co-funders include **Pharmatory Oy** and **Nokian Tyres,** and the NMR instruments are also used by companies such as **Admescope, Agnico Eagle Finland, Brightplus, Borealis, GrainSense, Optitune,** and **Organon**. The goal is that, as research methods and innovations supporting green technology continue to develop, new companies operating in the field will also start using the equipment.

The promised technical service life of the equipment is approximately **10–15 years**, but in practice NMR instruments may remain operational even longer. Thus, the equipment will serve the teaching and research at the University of Oulu, as well as the needs of the Oulu region's business sector, for many years to come.

The instrument is used to study, for example, carbon dioxide-binding cements.

Magnetic Resonance for Green Transition

Objectives:

- To create an internationally top-level magnetic resonance research environment to promote the green transition.
- To support regional education and RDI activities by acquiring new, more efficient measurement instruments that are openly accessible.
- Using these instruments, to develop new research methods that will be applied to the development of green-transition technologies and materials, including research on carbon-neutral cements and more sustainable battery materials.
- To support the formation and growth of new collaboration networks and SMEs, particularly in fields related to the green transition and lifelong health.

Actions:

- A **Bruker Avance NEO 400 MHz spectrometer** suitable for advanced chemical analysis was acquired, along with **5 mm and 10 mm probes**.
- The plan was to re-use the magnet from an older device. However, as a result of a successful competitive bidding process, the selected manufacturer supplied a new magnet. This allows the old 400 MHz instrument to remain in use, thereby increasing the instrument capacity for several more years.
- The device was installed in **September 2025**, after which the users have been trained to utilise the equipment.
- Additionally, an **uninterruptible power supply (UPS)** will be acquired to protect the new NMR instrument, as well as all other devices in the MR4GT infrastructure. Installation will take place in **March 2026**.

FACTS:

Name of the project:
MR4GT – Magnetic resonance for green transition

Code in EURA2021 system: A81203

Project benficiaries:
Coordinator: University of Oulu.
Partners: City of Oulu, Pharmatory Oy, Nokian Tyres.

Duration: 1.6.2024 – 31.5.2026

Costs:
Total: 507 500 EUR, ERDF/Council of Oulu region: 355 249 EUR