

## Project title

Thermal Conductivity Measurement Setup for Magnetocaloric Nanocomposites

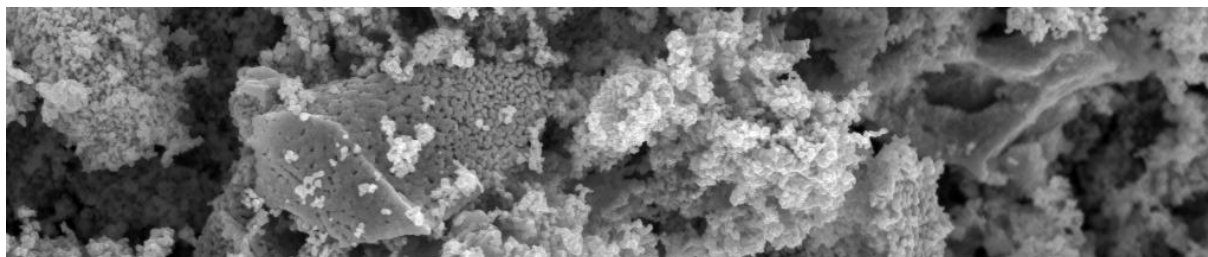
## Project description

Magnetocaloric materials are attractive for environmentally friendly cooling technologies. Unlike conventional refrigerants, leading to a high global warming impact, magnetocaloric cooling exploits reversible temperature changes induced by an applied magnetic field. Such solid-state cooling concepts can greatly reduce environmental impact from the cooling system.

Thermal conductivity is a key physical parameter for evaluating the performance of magnetocaloric materials, as it governs heat transfer efficiency during cooling cycles. Reliable measurement of thermal transport properties is therefore essential for assessing the suitability of newly developed magnetocaloric materials for practical applications.

This master's thesis focuses on the development of a laboratory setup for measuring thermal conductivity in different material forms, such as powders, pellets, and thin films. The work will involve designing and assembling a measurement system based on established principles, followed by validation using reference materials with known thermal properties. The resulting setup will enable comparative characterization of magnetocaloric nanocomposites towards sustainable cooling applications.

The project provides hands-on experience in experimental design, instrumentation, and data analysis. The scope is appropriate for a 30/45 hp master's thesis and emphasizes practical skills in building and evaluating measurement tools commonly used in materials science.



## Research group/environment

The Green Nanodots Group at Umeå University focuses on the design, understanding, and application of sustainable functional nanomaterials. Our core materials platforms include colloidal quantum dots, perovskite quantum dots, and bio-derivable carbon dots, as well as other nanomaterials with strong potential for environmentally friendly technologies. We can access all local research infrastructure and are actively involved in multidisciplinary collaborations. The research environment in our group will fully support the research training for master's students.

**To be conducted at:** the Green Nanodots group, the Department of Physics, Umeå University

**Level:** A (Master, 30/45/60 hp/ECTS depending on program)

**Examiner:** TBD

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