

Graphene Hall Devices

RISE offers leading expertise in Hall and Quantum Hall devices.

Since its inception, graphene has been envisioned to revolutionize a plethora of technological applications. One area where this dream is close to being achieved is in the field of quantum resistance metrology. Graphene has already been proven to surpass conventional materials, and has cemented its place in the new SI-system as the primary realization of resistance in a growing list of countries. Furthermore, the success of graphene as a quantum Hall device has also aided in the advancement of its use as a regular Hall sensor. While graphene Hall sensors are not as mature as quantum Hall devices, it is an active area of development.

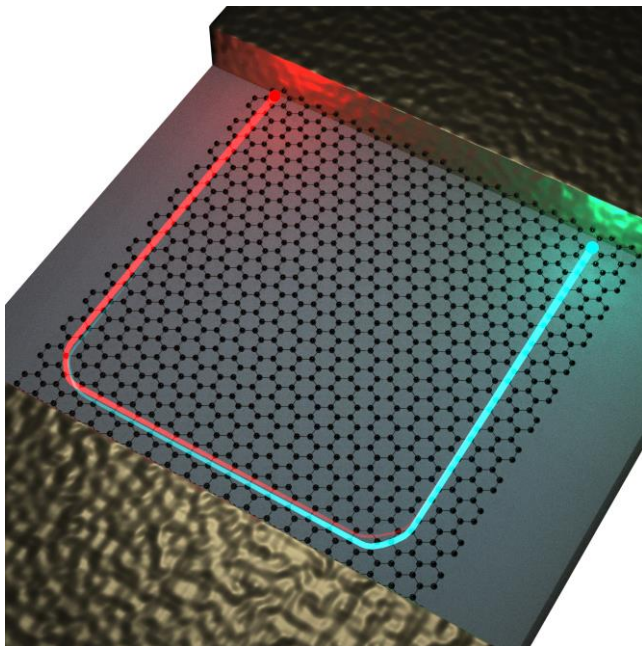
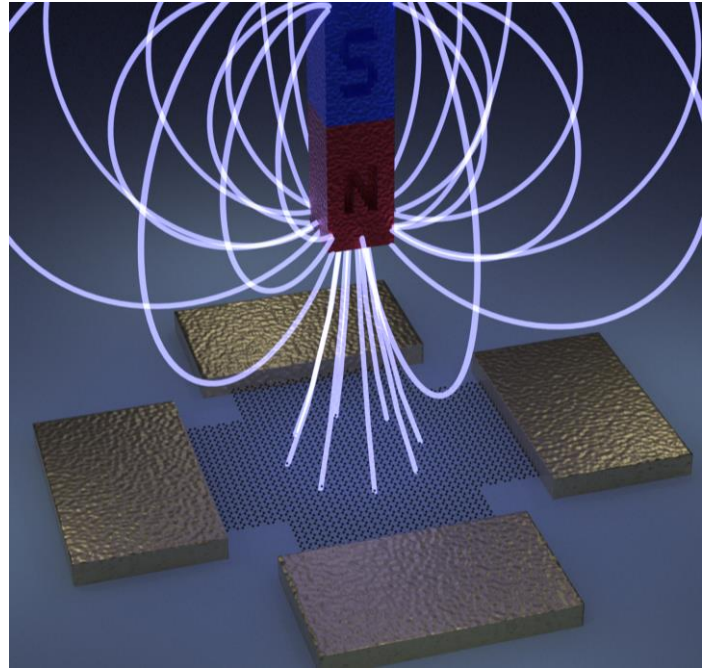
Why RISE?

RISE is not only the premier Swedish research institute, but it is also the National Metrology Institute of Sweden. We have therefore been involved in the development of graphene Hall devices since the early days. Due to our long history of working with graphene, RISE was one of the first who moved to fully adopt graphene in the use for resistance calibrations. We possess not only the knowledge and experience to perform precise electrical characterization of graphene (and other materials), but we also have expertise in microfabrication and designing working graphene devices. As a partner, RISE can offer the following:

- **Cryogenic measurements**
- **Magnetotransport characterization**
- **High-precision resistance calibration**
- **Microfabrication**

Measurement capabilities

- Primarily focused on DC-characterization, but AC but can be accommodated.
- Cryostat system with millikelvin temperature control from 300 K to 1.7 K.
- Magnetic fields up to 12 T (out-of-plane) with mT control.
- Standard measurement setup can detect signals down to nV-level or pA-level.
- High-precision comparison measurements using a cryogenic-current-comparator can provide part-per-billion accuracy w.r.t. measurement noise.
- Use of calibrated instruments with traceability to a primary standard.



Microfabrication capabilities

- Access to state-of-the-art clean room at Chalmers University of Technology.
- Electron beam lithography.
- Photolithography.
- Fabricate graphene Hall devices.
- Fabricate gated graphene devices.
- Control carrier density of graphene.

Related support functions of RISE

- Helping in designing custom graphene devices (CAD etc.).
- Setting up suitable experiments to characterize your graphene devices.
- Validate performance and provide calibration proofs.

