

Cryogenic device modeling - Master's thesis project

NordAmps AB + Lund University

Cryogenic devices are used in areas such as satellite communication, high-performance computing, and quantum computing. In satellite communication the signal travels between earth and space which will put other limitations to the transceiver performance, for instance the temperature will be lower and the path loss different. There is a clear need to accurately model the cryogenic behavior of transistors that are used in such applications.

You will work with an emerging technology in the semiconductor field suitable for higher frequency electronics, such as satellite communication. To evaluate the suitability of the technology in cryogenic temperatures, measurements and device modelling work is needed. You will measure and explore the temperature behavior of the devices. Typical transistor parameters that exhibit a temperature dependence are electron scattering and the contact resistances. The cryogenic measurement results will then be modeled to provide a compact transistor model with cryogenic behavior. Such a model is necessary to do circuit design work for low temperatures.



Figure 1 Cryogenic probe station

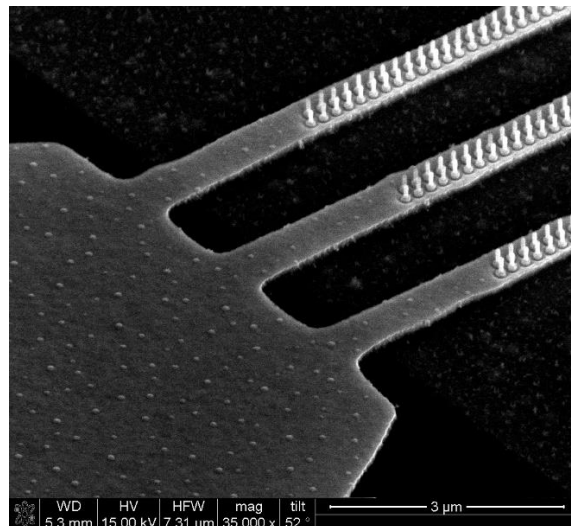


Figure 2 In(Ga)As nanowire device with 3 fingers

Background

NordAmps, a high-tech startup company are offering this master's thesis project in collaboration with the Nanoelectronics group at the Department of Electrical and Information Technology at LTH. We are looking for preferably two students for a project related to exploring the cryogenic behavior of III-V nanowire transistors.

NordAmps develop In(Ga)As vertical nanowire transistors on Si-substrates with competitive device performance suitable for applications within 5G, 6G and satellite communication. The – high speed operation enabled by optimal material properties and by the vertical topology. NordAmps technology combines the high performance of III-V materials in a scalable technology with the economy of scale supported by silicon substrates.

Project description

The Master's thesis project will consist of:

- Device measurements in cryostat at 40-70K.
- Implement the cryogenic transistor behavior to the device model.
- Correlate measurements with transistor simulations in a circuit simulator such as Cadence, AWR or ADS.

Qualifications

- Master's students in Electrical Engineering, Engineering physics, Engineering nanoscience or equivalent.
- Good knowledge of analog and high frequency electronics
- Good knowledge of nanoelectronics
- Field effect transistor theory

Application

Please send an email with your application.

Location: NordAmps AB, Ideon Lund

Website: <https://nordamps.com>

Questions about the position will be answered by;

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