

PhD position at NaMLab

Investigation of Negative Capacitance Effects in Epitaxial Ferroelectric Thin Film Devices

NaMLab is looking for a PhD candidate for investigation of fundamental questions with regard to structural and electrical changes during switching of ferroelectric-dielectric multi-layer capacitor devices. Our overall goal is to finally answer the question how the gradual transition between multiple polarization states in ferroelectrics that were observed in the negative differential capacitance region of the QV-curve on the one hand side, the abrupt switching mechanisms that occur in the very same ferroelectric films on the other hand, and the intermediate regime that exhibits features of both extremes and moreover, includes electron tunneling phenomena, can be explained and described in a unified modeling system. The focus is on epitaxially grown $K_xNa_{1-x}NbO_3$ films that are manufactured by our project partners.

The following aspects shall be investigated:

- Switching process of the electrical polarization in strained ferroelectric films
- Stabilization of the ferroelectric layer in the negative-capacitance region
- Interplay between polarization switching and charge tunneling
- Realization of locally-active oscillators based on stabilized negative capacitance

Responsibilities:

- Manufacturing of ferroelectric devices based on epitaxial ferroelectric thin films
- Electrical and physical characterization of the manufactured devices
- Physical modeling of ferroelectric switching processes and device modeling
- Communication with project partners and reporting

Your profile:

- M.Sc. / M.Eng. in electrical engineering / physics
- Well-grounded knowledge on semiconductor manufacturing and device physics
- Good technical comprehension and creativity
- Interest in deep understanding of physical mechanisms
- Ability to work in a team environment

The following skills are a plus:

- Expertise in electrical characterization
- Experience in working in a clean room environment
- Expertise in coding Matlab, Python,

Period:

- Planned starting date: March 2021, subject to final grant approval
- Duration: 3 years

We offer:

The salary will be based on German research organization standards.

For further information please contact:

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