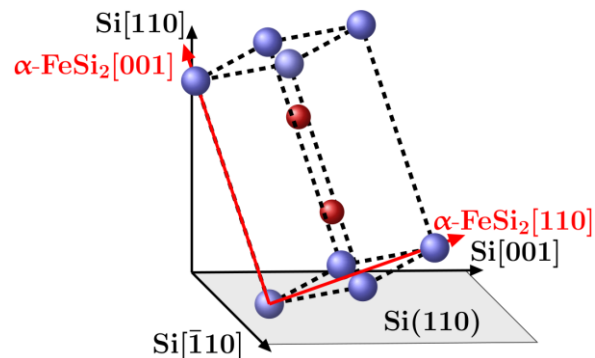
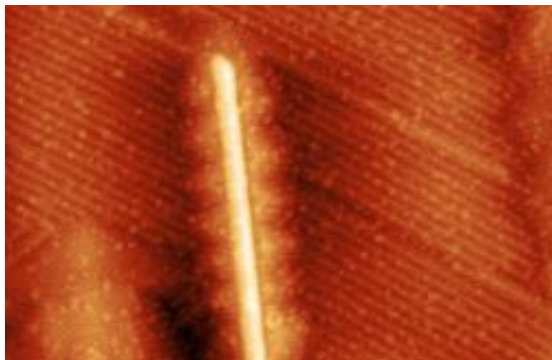


Master thesis at the Institute for Photon Science and Synchrotron Radiation (IPS)

Growth and structural characterization of FeSi₂ nanostructures



Left: α -FeSi₂ nanowire on Silicon (110) surface. Right: corresponding epitaxial relationship

Motivation:

Nanostructures of transition metal silicides constitute fundamental building blocks of current micro- and nanoelectronics. Iron silicide is a particularly intriguing member of this class of materials, since it is the only representative that forms both, semiconducting and metallic phases. The metallic phases exhibit three different crystal structures that can be stabilized at room temperature on silicon substrates as metastable nanocrystals with various dimensionalities, e.g. nanowires, nanoislands and ultra-thin films.

Scope of the thesis:

The aim of this master thesis is to grow nanostructures of the surface-stabilized α -, γ - and s - phases of FeSi₂. You will start with the growth of α -FeSi₂, which is already established in our group and then continue with determination of the suitable parameters for the preparation of γ - and s -FeSi₂. In the course of this work you will acquire knowledge and hands-on experience in ultrahigh vacuum technology, growth of nanostructures by molecular beam epitaxy and their characterization by electron and x-ray diffraction methods. After the structural characterization, the magnetic properties and lattice dynamics of the nanostructures will be investigated by synchrotron experiments at the Deutsches Elektronen Synchrotron (DESY, Hamburg).

Topics:

- Surface physics / nanostructures
- Molecular beam epitaxy
- Vacuum technology
- Synchrotron methods

Start after consultation

Contact:

Dr. Svetoslav Stankov
Svetoslav.Stankov@kit.edu
Jochen Kalt
Jochen.Kalt@kit.edu