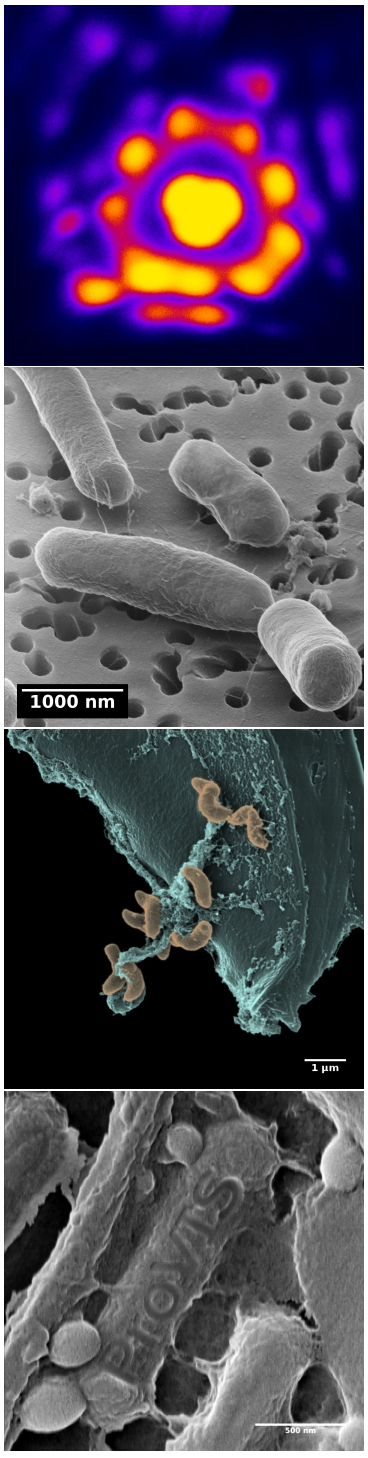
Zeiss ORION NanoFab

Helium Ion Microscope

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

Instrument Description:

The Zeiss ORION NanoFab is a Helium-ion beam microscope with sub-nanometer resolution. The instrument is equipped with an Everhart-Thornley secondary electron detector. It can be operated with helium as well as with neon. The accessible acceleration energies for the ions range from 5kV to 30kV. The electron flood-gun of the system allows for imaging of non-conductive samples.
Apart from imaging purposes the ion beam can be used for nano-structuring of samples. The FIBICS nano-patterning software allows for high-performance milling and ion-beam etching and, in combination with the installed Omniprobe gas-injection system, for nano-depostion of tungsten or silicon dioxide.



Applications:

- high-resolution (0.5nm) and high depth of field surface-sensitive imaging of
  - nanostructures und nanoparticles
  - biological and geological systems
- nano-structuring
  - create sub-10nm structures using He ion beam
  - lithography using Ne ion beam
  - depositon of tungsten or silicon oxide using the gas-injection system
- surface-near He and Ne implantation into solids

Requirements for Samples:

Any type of sample can be measured as long as it is water-free and does not outgas in the base vacuum (10^{-7} mbar range). Conductive samples are desirable. If this is not the case either the samples can be sputter-coated with a thin layer of Au/Pd or Cr or the electron flood-gun can be used for charge-compensation.
The sample size must not exceed a diameter of 20mm and a height of 5mm such that they can be mounted on a standard SEM stub.

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Picture captions (from top):

- trimer of the tungsten tip
- *E.coli.*
- nitrogen-fixing bacteria in a root-nodule
- cutting bacteria using Ne-beam