

MASTER'S THESIS

Probe optimisation for scanning microwave microscopy

Scanning microwave microscopy (SMM) is the combination of an atomic force microscope with a vector network analyser (VNA) to measure locally resolved impedances. The VNA generates a microwave signal, which is coupled into a metallic or metallised probe of a scanning force microscope. The forward travelling microwave is reflected at the probe-sample interface and the reflected signal is measured by the VNA. The proximity of the probe to the sample surface creates an impedance that changes the magnitude and phase of the reflected signal. The reflected signal therefore carries locally resolved information about the material under test. This signal can be translated into material properties such as complex impedance, capacitance and resistance¹.

To ensure that most of the energy is delivered to the sample at a high rate and that signal changes are resolved locally, a critical step is the fabrication of the probe used for SMM measurements: Optimising factors such as probe length, probe diameter and probe shielding will result in higher lateral resolution and measurement sensitivity¹.

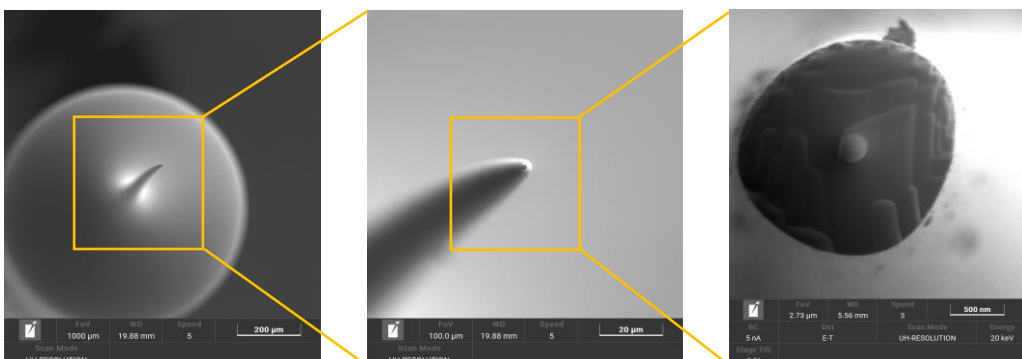
The Nanoelectronics Group at the Biophysics Institute of the Johannes Kepler University Linz is looking for Master students to support the team in the fabrication and optimisation of SMM probes.

Your tasks and learning experiences will include:

- Laser pulling for the fabrication of coaxial probes
- Sputter coating for probe shielding
- Clean room experience
- Insight into different microscopy techniques: Scanning electron microscopy (SEM), scanning microwave microscopy (SMM) and atomic force microscopy (AFM)

If you are interested in this project or have any questions, please contact Maxwell Sparey (maxwell.sparey@jku.at) or Hannah Seferovic (hannah.seferovic@jku.at).

Our team looks forward to meeting you!



Scanning electron microscopy (SEM) images of a coaxial probe fabricated for scanning microwave microscopy (SMM) measurements.