Microchannel characterization of liquid sample for Dynamic Nuclear Polarization (DNP) measurements

Type: Semester project Fall 2026

Fields: Microengineering

Project Overview

Dynamic nuclear polarization (DNP) is a powerful technique that enhances NMR sensitivity by transferring polarization from electron spins to nuclear spins. At LMIS-1, an in-house miniaturized DNP chip has been developed to investigate novel approaches for performing DNP measurements at the microscale. While the chip has already demonstrated effective operation with solid samples, measurements with liquid samples remain challenging. This is because dedicated microchannel devices are needed to confine the liquid sample within a small volume, typically in nL scale.

This project aims to overcome this limitation by developing reliable techniques for filling, sealing, and characterizing microchannels fabricated in previous work. In parallel, a new device concept will be investigated if needed, potentially involving clean-room fabrication.

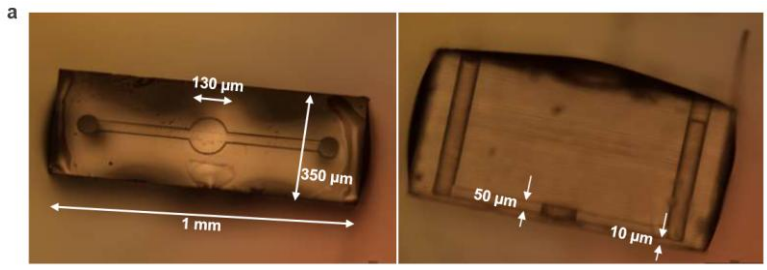
What You Will Work on

Tasks will be tailored to your background and interests and may include:

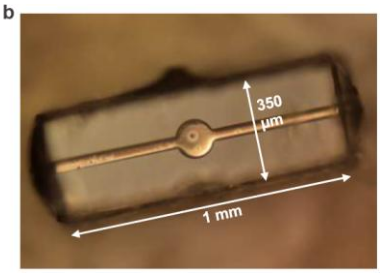
- Develop and optimize methods for filling and sealing the fabricated microchannels with liquid samples
- Evaluate the suitability of device for on-chip DNP measurements
- Investigate new microchannel/device concept and perform clean-room fabrication

Why join

- Hands-on experience in microfabrication and device characterization
- Work on an interdisciplinary research study



FEMTOPRINT channel view and side view



Si/Glass channel view

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