



# Open Master Thesis Project

Tube-based material transfer for minimally invasive in situ bioprinting

BIROMED-Lab

Department of Biomedical Engineering

The Bio-Inspired RObots for MEDicine-Laboratory (BIROMED-Lab) at the Department of Biomedical Engineering (DBE) at the University of Basel offers an exciting, multidisciplinary, and applied learning- and research environment. Our research is interdisciplinary and organized in close collaboration with other research groups at the department, clinicians and industrial partners.

## Project background:

You will join the BIROMED-Lab performing medical robotics and mechatronics research under the lead of Prof. Dr. Georg Rauter. You will contribute to a bigger project in which we aim to realize a robotic device for in situ printing of biological tissue enabling less invasive treatments based on an innovative technology previously developed at the BIROMED-Lab. You can find information about the project state in a recent publication.

## Project description:

Your task will be to develop a tube-based material transfer unit with integrated temperature control for controlling the printing material's temperature during transfer. Furthermore, you will work on developing a miniaturized extrusion nozzle that is mounted at the tip of the transfer tube. Strategies for cross-linking and anti-clogging of the nozzle are additional challenges that you will tackle.

Your tasks will include:

- Analyzing the requirements for a temperature controlled material transfer through a tube with filament formation through a nozzle at the tube's tip
- Conduct research on principles that could be used for temperature control, cross-linking and preventing clogging of the nozzle in minimally invasive in situ printing
- Design and implement a prototype of the tube-based material transfer unit with integrated temperature control and a nozzle at its tip
- Evaluate the performance of the developed prototype according to the specified requirements

Start date: August 2023 or upon agreement. You will work at the DBE located in the new SIP Basel Area main campus, an exciting and modern working environment in which various research groups of the DBE are located.

## Your profile:

- You are pursuing a master's degree in mechanical engineering or a closely related disciplines
- You have experience in mechatronics
- You are a hands-on person who likes to work with hardware
- You are curious, motivated and self-driven
- You want to work in and contribute to an interdisciplinary and applied research environment

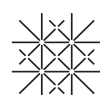
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**University  
of Basel**

Department of  
Biomedical Engineering