University of Basel

DBM Basel
Department of Biomedicine

OPEN POSITION – MASTER THESIS IN THE ORAL IMPLANTOLOGY LAB, UNIVERSITY CENTER FOR DENTAL MEDICINE BASEL UZB

Topic: Unlocking the osteogenic potential of electrospun nanofibrous scaffolds
Duration: 6 months or more
Starting date: Flexible, earliest starting date is Mid-September 2025

General mission of the Lab

In this lab, we develop predictive in vitro models to gain fundamental knowledge on cell-material interactions, and cell fate decision in response to environmental cues. We use a cell-molecular toolkit of biomaterials and different cell types to engineer 3-dimensional systems. Specifically, we develop fibrous scaffolds based on electrospinning, investigate osteogenesis of different progenitor cells under various outer stimuli, and aim to gain a thorough understanding of bone remodelling and soft tissue adhesion in response to dental implants. We strive to find solutions for clinical challenges in oral implantology with the goal to ultimately improve patient satisfaction and provide long-term solutions. The Oral Implantology Lab is based at the University Center for Dental Medicine Basel, UZB, next to the Rosental Campus. Our department comprises three research focus areas, Oral Microbiology, Biomaterials & Technology, and Oral Implantology, that work in tight collaboration and with strong links to the dental clinics.

A bit more information on the project

Bone augmentation often precedes dental implant placement, but the current gold standard—the autograft—is not suitable for every patient. Therefore, effective bone engineering methods are needed, extending well beyond dentistry alone. While most tissue engineering approaches focus on the micro- and macroscales, the nanoscale is frequently overlooked. Yet, the nanoscale plays a crucial role in understanding bone remodelling and achieving successful clinical outcomes.

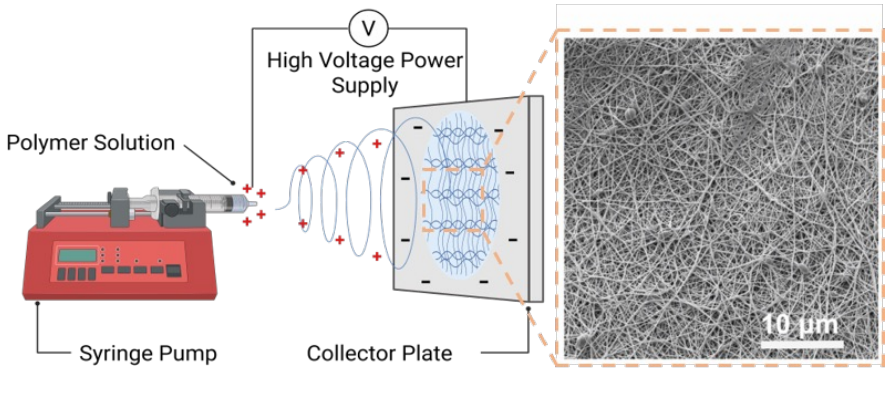

Figure 1 A typical electrospinning setup that is used to produce a nanofibrous scaffold

In this project, we aim to engineer a nanoscale bone scaffold using the electrospinning technique. In electrospinning, a polymer solution is extruded through a nozzle to which a high voltage field is applied. This process leads to a nanofibrous scaffold that is deposited on a collector plate. Here, our first objective is to focus on different biomaterials for electrospinning, efficient scaffold design with tuneable porosity and scaffold characterisation. Building on this, we will perform in vitro experiments using both human cell lines and primary cells isolated from dental pulp (human dental pulp stem cells; hDPSC) to analyse the adhesion and osteogenic differentiation potential in response to the different scaffolds.

What we expect from you

We are looking for a curious master student interested in supporting this project for a duration of 6 months or more. We are looking for someone that works independently and brings their own ideas, so we can also tune the content of the project to your background and interests. Previous experience in wet lab techniques, biomaterials, material science or literature research would be appreciated but is not strictly required if you are dedicated and eager to learn fast.

What we offer you

- We will teach you how the electrospinning technique works
- You will be able to design your own electrospinning experiments
- You will learn different scaffold characterising methods, such as mechanical testing
- We will teach you how to work in a well-equipped state-of-the-art BSL 2 cell culture laboratory
- We will teach your or help you complement existing experience with scientific literature search, scientific writing, presenting your work in oral presentations and posters
- You will be fully integrated in the team. You will be invited to present during our weekly group meetings and monthly department meetings to profit from feedback from an interdisciplinary audience
- Naturally, you will be invited to partake in any social activities such as summer barbecues, Christmas events and more
- In addition to the main supervision by the group head (Prof. Dr Géraldine Guex), you will be directly supervised by a PhD student.
- Have we peeked your interest? Don't hesitate to contact us for a chat or visit of the lab.

We look forward to hearing from you..

Contact information

Please send your application (CV, max. 2 pages and motivation letter telling us more about yourself and why you'd like to join, max 0.5 page) or questions you may have via email to Isabelle Imhof: isabellechristine.imhof@unibas.ch

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