



PhD Position

Center for Intelligent Optics

Department of Biomedical Engineering, University of Basel, Switzerland



University
of Basel

Department of
Biomedical Engineering

The Center for Intelligent Optics (**CIO**) develops advanced optical technologies, including imaging, spectroscopy, and laser ablation methods. Our goal is to bridge these cutting-edge laser technologies with clinical practice, developing solutions that enable accurate and real-time diagnosis and therapies.

Project background:

Polyethylene wear is a major factor affecting the long-term performance of hip implants, as it can lead to particle-induced inflammation and implant loosening. Understanding the mechanisms and patterns of wear at the microscopic and molecular levels is therefore critical for improving implant longevity and patient outcomes. In this project, high-resolution spectroscopic imaging will be employed to map chemical changes and structural degradation in the PE material, while correlating these findings with biological responses observed in surrounding tissues. The principal aim of this interdisciplinary project, entitled "Comprehensive analysis of determinants of polyethylene wear and the related tissue response to improve outcomes in total hip arthroplasty" is to characterize the in vitro and in vivo wear behavior of polyethylene (PE) sockets from retrieved THA components. This will be achieved using advanced optical imaging techniques such as Fourier Transform Infrared (FTIR) spectroscopy and Raman spectroscopy. To achieve this goal, two positions have been designed. The first position (technician) will focus on performing Raman/FTIR on retrieved samples. The PhD position (**this position**) will focus on developing a deep-learning algorithm for analyzing the acquired experimental data.

Job description:

The PhD position will focus on development a comprehensive and AI-driven platform for automated analyzing on acquired data (such as labeling, and clustering.). The candidate is expected to visit research facilities in the US, Germany, and Switzerland to collaborate with the research partners and expand their knowledge in the topic.

Your profile:

- University master's degree in Computer Science, Physics, Biomedical Engineering, or closely related fields
- Excellent Master's and Bachelor's grades
- Strong programming skills, preferably in Python, with experience in deep learning algorithms
- Experience with Raman and/or FTIR imaging is a plus
- High motivation to work with optics and their biomedical applications,
- Applicants are expected to have excellent language skills in English.

Apply for this project by email (**Subject: PhD-CIO-25105**) to [arsham.hamidi\[at\]unibas.ch](mailto:arsham.hamidi[at]unibas.ch) with the following documents as a single PDF file (**application deadline: 15 November**):

- CV including publication list
- Motivation letter (max 2 pages)
- Diplomas and course transcripts
- The names and addresses (including email) of three references

What we offer

- Opportunity to work on a highly innovative project within a highly interdisciplinary environment
- Enrollment in an established 3-year PhD program (with 1-year possible extension) in Biomedical Engineering (in English)
- The salary is very competitive by international standards and will be according to the guidelines of the University of Basel. Five weeks of holidays per year, 42 working hours per week.

 **Want to know more about us?** check out www.cio.dbe.unibas.ch.