

October 7, 2017



## Doctoral Student position (4 years)

### Background

Osteoarthritis (OA) is the most common joint disease in the world. OA is primarily characterized by progressive degeneration of articular cartilage along with structural and compositional changes in underlying subchondral bone and cartilage-bone interface. OA is nowadays regarded as a whole-joint disease having different phenotypes. OA is commonly thought as a disease affecting the elderly people; however, as joint injuries may lead to OA, also younger people suffer from OA. Complex etiology causing the OA related tissue-level and cellular-level changes and subsequent clinical symptoms is not fully understood.

Fourier transform infrared (FTIR) spectroscopy is a powerful method for characterization of the composition of biological tissues. FTIR microscopy can be used to characterize the spatial composition of extracted tissue specimen. In principle, FTIR spectra can also be used for in vivo diagnostics of joint diseases, as spectra can also be collected through fiber optics. Currently, the spectral analysis methods limit the full potential of FTIR spectroscopic characterization of articular cartilage. Multivariate spectral analysis methods applied to FTIR spectroscopy, combined and validated with traditional histopathology and biochemistry, may provide new insights on the earliest tissue level and cellular level biochemical and structural changes in OA.

### Aims

To experimentally investigate the early phases of OA in tissue level and cellular level by applying FTIR microscopy and multivariate spectral analysis methods. As another aim, the biochemical changes caused by joint injuries will be investigated by applying FTIR microscopy and fiber optic FTIR spectroscopic measurements.

### Research environment

The research will be conducted in the DIOS group at the Research Unit of Medical Imaging, Physics and Technology (MIPT), Faculty of Medicine, University of Oulu, Finland (<http://www.mipt-oulu.fi/saarakkala-group/>).

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The DIOS group is located at the Kontinkangas campus. The DIOS group is a member of Medical Research Center Oulu (MRC Oulu; [www.oulu.fi/mrc](http://www.oulu.fi/mrc)). The group has Thermo Nicolet iN10MX FTIR imaging microscope in their laboratory for the measurements, and also access to other FTIR instruments through national and international collaborators. Furthermore, traditional histopathology and light microscopy as well as polarized light microscopy facilities are directly available at MIPT. The group has access to human tissue material.

A student will be enrolled in The University of Oulu Graduate School (UniOGS; <http://www.oulu.fi/uniogs>). The general requirements for admission to the UniOGS can be found at the following web pages: [http://www.oulu.fi/uniogs/requirements\\_for\\_admission](http://www.oulu.fi/uniogs/requirements_for_admission).



### **Length of the position**

The contract will be made for four (4) years including a trial period of four (4) months.

### **Requirements**

The suitable background for a successful candidate is biophysics, medical physics, biomedical engineering, or other related field. Candidates with a recently completed M.Sc. degree or equivalent, or who are currently finishing their graduate degree, are invited to apply. Programming skills with MATLAB, Python or other suitable programming language are essential requirements for the position. Experience in FTIR spectroscopy, Raman spectroscopy and/or light microscopy are considered as advantages.

### **Salary**

The salary of the appointed researcher will be based on the demand level 2-4 chart for the teaching and research staff of Finnish universities. In addition to the basic salary, an additional salary component (not more than 46.3% of the basic salary level) will be paid based on personal achievements and performance. The total salary for a starting Ph.D. student is approximately 2300 euros per month.

### **Application**

The application documents should include:

- 1) A cover letter describing motivation for this position and earlier research experience
- 2) Curriculum vitae and degree certificates
- 3) Full list of publications
- 4) Full name and e-mail addresses of 1–2 referees (reference letters can be also included).

Applications, together with all relevant enclosures must be submitted by using electronic application system by **November 10, 2017**:

<http://www.oulu.fi/university/jobs>

## Contact details

Direct any questions or correspondence to:

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