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PhD on Diagnosis of DNA-methylation using THz spectroscopy

The Signal Processing Systems and Integrated Circuits groups at the Electrical Engineering at TU/e have a vacant PhD position in the field of epigenetic diagnosis using terahertz spectroscopy.

Position	PhD-student
Department(s)	Electrical Engineering
FTE	1,0
Date off	31/01/2021
Reference number	V36.4777

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Job description

Background

Epigenetics covers the study of persistent modifications of gene expression leading to a change of physical properties without a change of genetic properties. Epigenetic changes of DNA are heritable and do not involve the DNA sequence, but are rather modifications of DNA that affect the function of a cell. An example under study is the addition and removal of methyl groups of DNA, so-called DNA methylation. Also other changes within the chromatin, such as modifications of histones, are of vivid interest. Epigenetic changes can be influenced by the environment and lifestyle and may lead to cancer, autoimmune disease, mental disorder and diabetes. Early diagnosis of epigenetic modifications is therefore of vital importance and is seen as a promising future pathway of personal health care. Although detection of e.g. DNA methylation is commercially available, devices are costly, and more importantly, every measurement is costly as it requires consumables. Spectroscopy at THz frequencies is particularly sensitive to vibrational degrees of freedom, such as CH₃-groups. In addition, the absorption in this spectral range scales with the dipole moment, and is large for molecules such as DNA. As the technique works at ambient conditions and does not need consumables, a diagnostic THz sensor would therefore be a practical and cost-efficient solution to current standards.

Research

The project is bridging electrical engineering and molecular biology and has as goal to study the opportunities of THz spectroscopy in the field of epigenetics thereby aiming at a first breakthrough clinical sensor using THz technology. After familiarization of THz spectroscopy and DNA-related samples, the research of the candidate will focus on the detection of epigenetic phenomena as mentioned above using THz spectroscopy and existing benchmark methods. Here to, the candidate will need to design an appropriate measurement setup, perform experiments autonomously and in collaboration with hospitals, institutes and other universities, and develop signal processing algorithms. The latter ones may include analyses based on chemical and physical interactions, complemented with contemporary AI principles. Eventually, the scientific results are to be translated into a diagnostic THz sensor system design e.g. for clinical usage. Collaborations within the Electrical Engineering department as well as with the Biomedical Technology department are foreseen.

Job requirements

We welcome applications from candidates with a MSc degree or equivalent in Biomedical technology, Biophysics, Medical physics, Clinical Technology, Electrical Engineering or related field. Experience with biomedical studies, (Python) programming and optics is advantageous.

Conditions of employment

- A meaningful job in a dynamic and ambitious university with the possibility to present your work at international conferences.
- A full-time employment for four years, with an intermediate evaluation after one year.
- To support you during your PhD and to prepare you for the rest of your career, you will have free access to a personal development program for PhD students ([PROOF program](#)).
- A gross monthly salary and benefits in accordance with the Collective Labor Agreement for Dutch Universities.
- Additionally, an annual holiday allowance of 8% of the yearly salary, plus a year-end allowance of 8.3% of the annual salary.
- A broad package of fringe benefits, including an excellent technical infrastructure, moving expenses, and savings schemes.
- [Family-friendly initiatives](#) are in place, such as an international spouse program, and excellent on-campus children day care and sports facilities.

Information and application

More information

Do you recognize yourself in this profile and would you like to know more? Please contact dr. J.L.M. van Mechelen, j.l.m.v.mechelen@tue.nl.

For information about terms of employment, click [here](#) or contact HRServices.flux@tue.nl.

Please visit www.tue.nl/jobs to find out more about working at TU/e!

Application

We invite you to submit a complete application by using the 'apply now'-button on this page. The application should include a:

- Cover letter in which you describe your motivation and qualifications for the position.
- Curriculum vitae, including a list of your publications and the contact information of three references.
- A recommendation letter from at least 2 references.
- Brief description of your MSc thesis.

We look forward to your application and will screen it as soon as we have received it. Screening will continue until the position has been filled.

Please keep in mind you can upload only 5 documents up to 2 MB each. If necessary please combine files.

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Electrical Engineering

The Department of Electrical Engineering teaches highly motivated Masters of Science, designers and doctoral candidates, and carries out breakthrough research in its field. The department has three spearheads: Connected World, Care and Cure, and Smart Sustainable Systems. These themes are reflected in the department's nine teaching chairs.

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