Cognitive electronic control of electrospinning

Summary

The task of the PhD project is to research the parameters that drive the quality of electrospun nanofiber layers, and devise the methodology of multiparameter monitoring and control of the electrospinning process. The ultimate goal is to demonstrate the viability of the developed approach in multilayer electrospinning. The project is part of Estonian Research Council project PSG897 “Cogni-E-spin: Cognitronic Electrospinning System for Automated Quality Control of Nanofiber Product”, which aims to create the technologies for scalable inline quality control of electrospun nanofiber meshes. The project is endorsed by industrial partners in Estonia and Hungary.

Research field:	Information and communication technology
Supervisors:	Dr. Tamas Pardy Ferenc Ender
Availability:	This position is available.
Offered by:	School of Information Technologies Thomas Johann Seebeck Department of Electronics
Application deadline:	Applications are accepted between June 01, 2024 00:00 and June 30, 2024 23:59 (Europe/Zurich)

Description

We are looking for a highly motivated and ambitious PhD candidate with experience in either electronics design, biomedical engineering, polymer technology, automation or control system design, electrospinning, or similar fields, to join our Lab-on-a- chip team (Website | Facebook) at Tallinn University of Technology (TalTech) and Budapest University of Technology and Economics (BME). Electrospinning is a flexible, scalable and affordable method to deposit nanofibrous layers, including composite multilayer membranes. Currently there is no robust and scalable automated inline quality control exists to qualify fiber formation. The task of the PhD project is to research the parameters that drive the quality of electrospun nanofiber layers, and devise the methodology of multiparameter monitoring and control of the electrospinning process. The ultimate goal is to demonstrate the viability of the developed approach in multilayer electrospinning.

The project is part of Estonian Research Council project PSG897 “Cogni-E-spin: Cognitronic Electrospinning System for Automated Quality Control of Nanofiber Product”, which aims to create the technologies for scalable inline quality control of electrospun nanofiber meshes. The project is endorsed by industrial partners in Estonia and Hungary.

Possible research questions:

- What are the observable process parameters of nanofiber mesh layer quality and what are their optimal ranges?
- What are the physical principles behind and the relations between the input process parameters and nanofiber layer quality?
- What is a possible empirical mathematical model which describes the above relations?
- How this model can be applied to practical systems and how its efficiency can be demonstrated?
- How the model can be scaled or adopted to other precursor systems and / or nanocomposites?

Applicants should fulfil the following requirements:

- MSc either in electrical engineering, mechanical/mechatronics engineering, applied physics, chemical engineering, biomedical engineering or related fields
- Have a clear interest in the topic of the position
- Excellent command of English
- Good candidate should like to play for a dynamic, interdisciplinary, and international team
- Successful candidate should have prior experience in at least one of those areas: embedded software, microcontrollers, electronics/instrumentation design, microfluidics instrumentation, chemical instrumentation or similar, electrospinning, polymer technology, image analysis

(The following experience is beneficial, but not required:)

- Experience with nanofiber meshes

We offer:

- 4-years PhD programme in cooperation of TalTech Estonia and BME Hungary, both are in the top 2% of global university rankings
- PhD/early-stage researcher position at TalTech with regular site visits at BME
- Opportunities for conference visits, research stays and interdisciplinary networking with partners both locally and internationally,
- Specific trainings taking into account the core skills of the candidate,
- Starting salary of 1828 €/month gross, with a possibility to increase,
- Position comes with full social and medical benefits in Estonia

For further information and details about applying, please contact Dr. Tamas Pardy (tamas.pardy@taltech.ee) and Dr. Ferenc Ender (ender.ferenc@vik.bme.hu) with Cogni-E-Spin in the e-mail title.

About the department

The Thomas Johann Seebeck Department of Electronics at Tallinn University of Technology offers a dynamic and innovative environment for PhD students interested in electronics and communication technologies.

- Research Focus: The department specializes in Cognitive Electronics and Communication Technologies, aligning its research with industry interests and future development trends.
- Laboratory Facilities: Students have access to a robust laboratory infrastructure, providing practical skills essential for professional careers.
- Historical Significance: Named after the renowned physicist Thomas Johann Seebeck, the inventor of the thermo-electric effect, the department carries a legacy of pioneering research in thermoelectricity, magnetics, and optics.
- Curriculum: The department is involved in the Communicative Electronics Master's program, which feeds into the PhD studies, ensuring a comprehensive educational pathway from undergraduate to doctoral levels.
- Industry Collaboration: There is a strong emphasis on cooperation with both local and international companies, government bodies, and organizations, enhancing the practical impact and relevance of research.

For detailed information on the PhD program, including specific research projects and opportunities for collaboration, prospective students can visit the department's official website.

To get more information or to apply online, visit https://taltech.glowbase.com/positions/817 or scan the the code on the left with your smartphone.