New Energy Technologies

Group leader: Peter Lund

The New Energy Technologies group of the Department of Applied Physics works in the field of renewable energy technologies. In the summer of 2024, the group offers a summer internship position on electrically and thermally conducting textiles. The group seeks a student in the Bachelor programme of Engineering Physics who would prepare a Bachelor's thesis based on the results of the summer work.

Offered project:

1. Screen-printing and electro-thermal impedance imaging of electrically heating textiles

The bachelor's thesis project focuses on developing screen-printable electrically conducting textile coatings for electro-thermal applications. The research is part of the SuperTextil of the FinnCERES Materials Cluster https://www.finnceres.fi/, and the work is done in close collaboration with the project team from the New Energy Technologies group and the Textile Chemistry group of the Department of Bioproducts and Biosystems.

The SuperTextil project is developing a solution to replace metallic fibers and yarns used in electronic textiles with environmentally sustainable electrically conducting biomaterials. The project's main target application is electrically heating textiles (EHT). EHTs have versatile applications in outdoor sports, workwear, and medical and therapeutic use. Still, their widespread use is limited due to high costs and low durability in use and washing. Moreover, incorporating metallic yarns into textiles is problematic for environmental sustainability and recycling. To overcome these challenges, the SuperTextil team is developing nanocarbon polymer composites to be applied as a durable, flexible, and stretchable conducting coatings on textiles. We now seek a bachelor's student to join the team for a summer project.

The bachelor's thesis project involves designing and fabricating electro-heater samples by screen-printing and testing their electrical and thermal performance by thermal imaging and impedance spectroscopy. After receiving training on these techniques, the student performs independent research as part of the research team to improve the heater designs, printing procedures, and/or the electro-thermal impedance imaging technique.

The topic can be tailored to the student's interests and skills. A student interested in hands-on materials research could focus on screen-printing and testing the electro-heater samples and materials. A student interested in measurement techniques could focus on developing the novel electrothermal impedance imaging technique conceived in the project.

The bachelor's thesis is written in English as the work is done with an English-speaking research team.

Thesis supervisor: Dr. Janne Halme, University Lecturer
Thesis advisor: Liza Kuttappassery, Doctoral Researcher

Contact: janne.halme@aalto.fi, +358503441695