

# Implementing Novel Organic Supercapacitors in Energy Harvesting Systems

## **Project proposal:**

The project aims at developing a demonstrator that utilizes the organic supercapacitor as the energy storing component for an energy harvesting system that can power up devices such as wireless sensors or terminals.

## **Background and purpose:**

Ubiquitous intelligence in the future world will be enabled by internet of things that senses and communicates with human, machine, and network. To make a such a wireless sensor node energetically autonomous will simplify the maintenance and streamline the network architecture. Energy harvesting and storage is therefore of great importance for such systems. Energy storage can be achieved by different methods, among them supercapacitor is one attractive alternative that is capable of storing energy efficiently and able to deploy it quickly for enormous amount of cycles without degradation. Supercapacitor is usually made with active carbon as the active material. The organic supercapacitor utilizing PEDOT:PSS and its cellulose composite as an active material is a new direction that promises high capacity and low environmental impact.

## **About the project**

- The work will start off with a literature study of different energy harvesting methods and how it can be coupled with the unique properties, performance and characteristics of organic PEDOT:PSS based supercapacitors. A literature survey and review report will be written up as a summary for this activity.
- Based on the literature and the state of art supercapacitor technology at Acreo, the most interesting energy harvesting methods will be selected.
- Several demonstrator ideas will then be generated and evaluated based on factors including: energy harvesting method, circuit robustness, system function requirements. The demonstrators should be able to show the robustness of the energy harvesting technique as well an eye catching effect that is swift, distinct and impressive. Simplicity and aesthetic aspects for the demonstrator should also be taken into account already from the beginning.
- The main body of the work will be of practical nature with the iterations and interactions of designing circuits and system, testing and implementing supercapacitors, and optimizing system performance.
- The work will result in a well documented final report as well as a functional demonstrator showing the potential for the organic supercapacitors.

**Requirements/knowledge**

Two students will be recruited for this diploma work, the students should have background knowledge in electronic circuits design and materials science. Knowledge in industrial design and product development are also valued.

**Application**

Please send your CV and application to [xin.wang@ri.se](mailto:xin.wang@ri.se) as soon as possible.

**Interviews and selection**

Interviews with the candidates will be conducted before a selection is decided.

**Project start**

As soon as possible

**Retribution**

18. 800 SEK will be paid to each student +at project completion previo approval from suprvisor.

**About RISE Acreo**

RISE Acreo offers innovative and value-adding ICT solutions for sustainable growth and competitiveness in industry and society. As one of Europe's top research institutes, we provide cutting edge resources and technologies within Sensors and Actuators, Power Electronics, Digital Communication and Life Science. Acreo is a part of RISE ICT.

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