OPEN ENTREPRENEURSHIP

CO-FOUNDER NEEDED

Biomass-derived microsupercapacitors for sustainable energy storage in IoT systems

3D VOLT

THE PROBLEM

The rise of the Internet of Things (IoT) has fueled the development of compact wireless micro-electronic devices such as portable sensors. Typically, Li-ion microbatteries are used for electrochemical energy storage in IoT devices. This is associated with challenges of i) limited power density, ii) limited lifetime due to corrosion and degradation, iii) the disposal and recycling after use and iv) the mining of scarce raw materials. Battery-less concepts based on energy harvesters such as solar cells address these challenges but are unable to provide the peak power demands of IoT systems. Therefore, they must be combined with a unit for temporary energy storage.

OUR SOLUTION

In 3D VOLT, we develop a biomass-derived microsupercapacitor (μSC) as a compact sustainable solution for energy storage in IoT devices ready to enter the mass electronic market as substitute for microbatteries. Compared to other μSC based on 2D thin film technology, our μSC consists of 3D carbon electrodes that are binder- and metal-free, compact and disposable due to the absence of toxic materials. The integration of sustainable organic electrolytes allows us to achieve a rated voltage of 2.7 V and a capacitance of >500 mF, which is better than existing miniaturized products.

PATENT STATUS

We have patented our technology for fabrication of 3D hybrid carbon electrodes (PCT/EP2023/084923).

FINANCIAL OVERVIEW

We have identified two possible business models: Business Model A with sales of standardized energy storage components in the mass electronic market to customers in the IoT industry and Business Model B with co-development of customized microsuper-capacitors with IoT device manufacturers.

MILESTONES ACHIEVED

In a first phase of innovation grants (ERC POC and DTU POC, 2024, total 1.5 MDKK) a pre-prototype of a fully encapsulated μSC with aqueous electrolyte has been fabricated reaching TRL3. A capacitance of 720 mF and leakage current in the μA range has been demonstrated, which is better than commercially available μSC with similar size.

TARGET MARKET & CUSTOMERS

IoT Industry, mainly device manufacturers searching for miniaturized energy solutions.

CO-FOUNDER PROFILE WE ARE LOOKING FOR

Must-have qualifications/background

- Business development
- Incorporation of startups in deep tech

Nice-to-have qualifications/background

- IoT industry or mass electronic market

Personal fit

- Interest in sustainable technology
- Motivation to collaborate on a long-term initiative, it takes time to enter the market!

TASKS & RESPONSIBILITIES (FIRST 3 MONTHS)

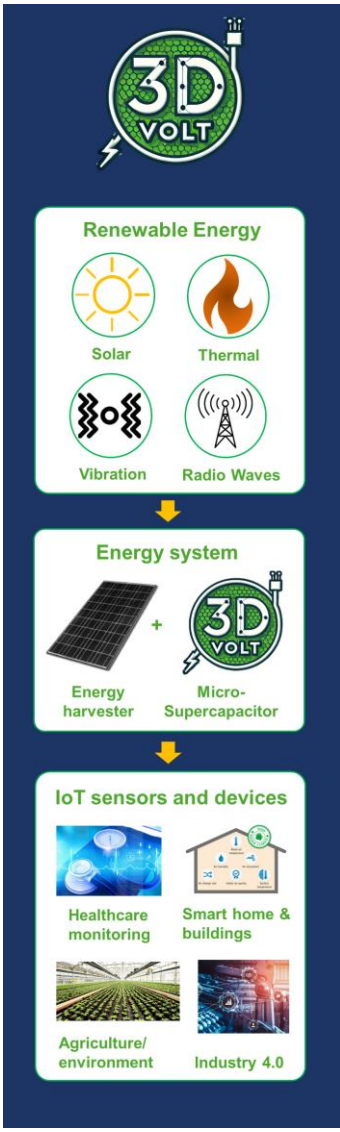
Market analysis and development of a business plan. Customer interviews. Assistance with competitor analysis.

ACADEMIC & ENTREPRENEURIAL BACKGROUND OF CURRENT CO-FOUNDERS

The team consists of Prof. Stephan S. Keller, Dr. Swetha Vasudevan Kanakkottu as postdoctoral researcher and Eva Vogt hired as research assistant. Swetha has been fully responsible for the scientific and technical development related to the proof-of-concept while Stephan has focused on funding acquisition, communication and resource management.

PHYSICAL ADDRESS

DTU Nanolab, Ørsteds Plads, Building 347, 2800 Kongens Lyngby.



ABOUT OPEN ENTREPRENEURSHIP

Open Entrepreneurship is a collaboration between all Danish universities aiming to create more research-based startups.
www.open-entrepreneurship.com

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