Finland energy storage applications

Contacts: Assistant professor Annukka Santasalo-Aarnio ([email protected]), Project specialist Dr. Arpad Toldy ([email protected])

Circular design of energy systemsTo ensure that the materials in used for the green energy transition are recoverable and therefore can be considered sustainable, we have two projects on circular design of energy systems. Hyper-sphere is an Academy of Finland project in collaboration with Prof. Rodrigo Serna at the School of Chemical Engineering. In this project, we develop new methods for processing end of life batteries that enable efficient energy and metal recovery. To support this work, our research group is also part of the Nordic5Tec battery network where we have an additional PhD student working with energy harvesting from end-of-life batteries. Additionally, we have another Academy of Finland project ECOSOL where the same eco-design principles are applied to solar cells.

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Thermal energy storage materialsThermal storage materials research consists of three different material groups, each with different storage methodology.(i)Thermochemical storage material research focuses on development and modifications of high energy density sorption salts. Substantial amount of heat can be released when water vapor adsorbs into these salts. With this method thermal energy can be stored in principle forever ntacts: Senior scientist Ari Sepp?l? ([email protected]), Academy post-doc researcher Roza Yazdani ([email protected])

(ii)Cold-crystallization of materials can be exploited for storing heat for several months at cold temperatures. The phenomenon is based on materials of which melt phase can supercool substantially and crystallize by heating. We focus on developing sugar alcohols cross-linked with polymers and testing the new materials in a prototype system ntact: Senior scientist Ari Sepp?l? ([email protected]), Laboratory manager Konsta Turunen ([email protected])

(iii)Materials for thermal regulation combine the properties of insulation materials and phase change materials. These materials can be exploited, e.g., for keeping different products near constant temperature during transportation ntact: Academy post-doc researcher Roza Yazdani ([email protected])

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Electrochemical energy storage can be one solution to theincreasing of the need for electrochemical energy conversion and storage devices .Thus, the Electrochemical Energy Conversion research group investigates and develops materials and devices for these applications. Our aim is to understand functioning of these to

improve the existing ones and to develop alternative solutions.

Our research is focused on investigating polymer electrolyte fuel cells (PEFC) and electrolysers as well as lithium ion batteries and supercapacitors and covers synthesis, characterization and integration of new materials. Alongside functionality of the materials and devices, we are interested in their durability and degradation mechanisms as well as optimization of above mentioned technologies for their applications.

Responsible (or sustainable) energy conversion and storage is one of the key issues for large-scale utilization of intermittent renewable energy sources. We want to foster and contribute this energy transition by developing those critical technologies:

Funded by Business Finland, the Next Generation Battery Materials and Concepts project will develop materials and their processing technologies for solid-state lithium batteries (SSLB). The project combines the expertise of multiple Finnish research organizations and private companies.

Read more about NextGenBat project

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