Solar energy research and development finland

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The research group of Prof. Kati Miettunen studies solar energy materials and systems. The focus of the research is improving stability of emerging solar technologies as well as designing sustainable materials, e.g. bio-based alternatives. There is also a new opening in developing solar energy systems namely for Nordic conditions.

KESPV focuses on extending the lifespan of new high-efficiency solar cell technologies and adapting them to the principles of the circular economy. Perovskite solar cells produce high efficiency ratios as a separate cell type, but they can also be combined with traditional silicon solar cells to form Tandem solar cells, which can further increase power output.

The key problem with perovskite cells is their lifespan, which should be increased 1) in order for the technology to be competitive in the commercial market and 2) for the principles of sustainable development to be implemented as well as possible (in the circular economy, the so-called long loop).

Northern conditions bring their own challenges to solar cells, such as large temperature fluctuations and the sun is low on the horizon affecting the spectrum of light, and the KESPV project covers these aspects supporting the implementation of the energy transition in Finland. KESPV focuses specifically on developing modelling research to solve these lifespan and sustainability issues in order to understand the changes taking place in cells and guide experimental research as efficiently as possible.

The KESPV project was ideated together with Prof. Kati Miettunen and M.Sc. (tech) Aleksi Kamppinen. In addition, Julianna Virjonen will be working in the KESPV project.

CIMANET is an interdisciplinary doctoral education network to promote sustainable growth. It strengthens the knowledge base required to enhance the bio-based industry with novel solutions unveiling the full potential of biomass.

Partners: Aalto University, University of Helsinki, ?bo Akademi University, Lappeenranta University of Technology, University of Oulu, Tampere University, Hanken School of Economics, University of Jyv?skyl?, and University of Turku.

Solar panels and batteries in individual households have become more common due to lower prices and the green transition, and this development has made HEMS operational strategies an important research topic. The HEMS strategy refers to the coordination of a household"s energy production, consumption and storage, taking into account the limitations of the energy system and the household (e.g. home heating).

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Various HEMS strategies have been studied extensively globally, but the conditions in Finland create special challenges due to, for example, large variations in solar energy production and high heating demand. Those Nordic challenges are the focus of this new project.

The RealSolar project investigates how to manage the increase of photovoltaics (PV) in our energy system while ensuring resilient and affordable energy supply, and that all levels of society have access to the benefits from PV and can thereby contribute to the just green transition.

Partners: Tommi Ekholm & Anders Lindfors (FMI); Sanna Syri (Aalto University); Saku M?kinen (University of Turku); Samuli Ranta & Ritva Salminiitty (Turku University of Applied Sciences).

The SUSMAT university profiling measure enhances the design of sustainable materials and manufacturing with data-driven approach to solve global energy, health, and well-being, and industrial production challenges.

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