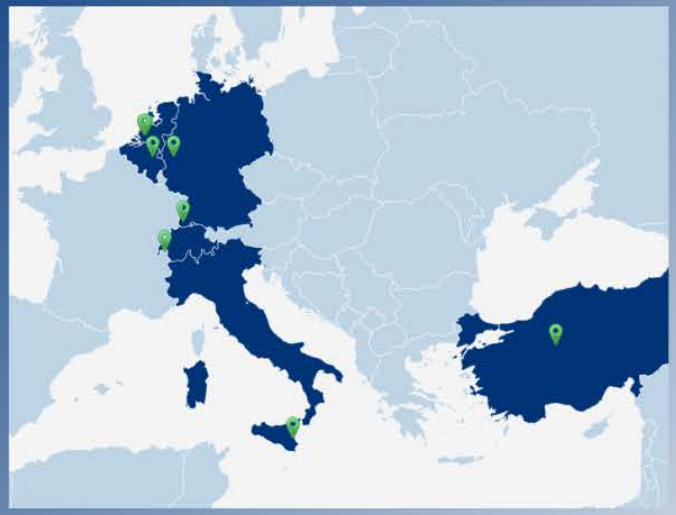
PROJECT PARTNERS



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GraphEnergyTech

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JÜLICH Forschungszentrum

CONTACTS

Project coordinator:
Karsten Bittkau
(Forschungscentrum Jülich)

Project management:
Anna Molinari
Dion Terwiel
(Uniresearch)

Communication & dissemination
Alessandra Lucini Paioni
Monique van Baalen
(Uniresearch)

Visit our website: silean.eu

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Funded by the European Union

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SiLEAN

PIONEERING A LOW-COST & ECO-FRIENDLY SOLAR CELL TECHNOLOGY

SiLEAN

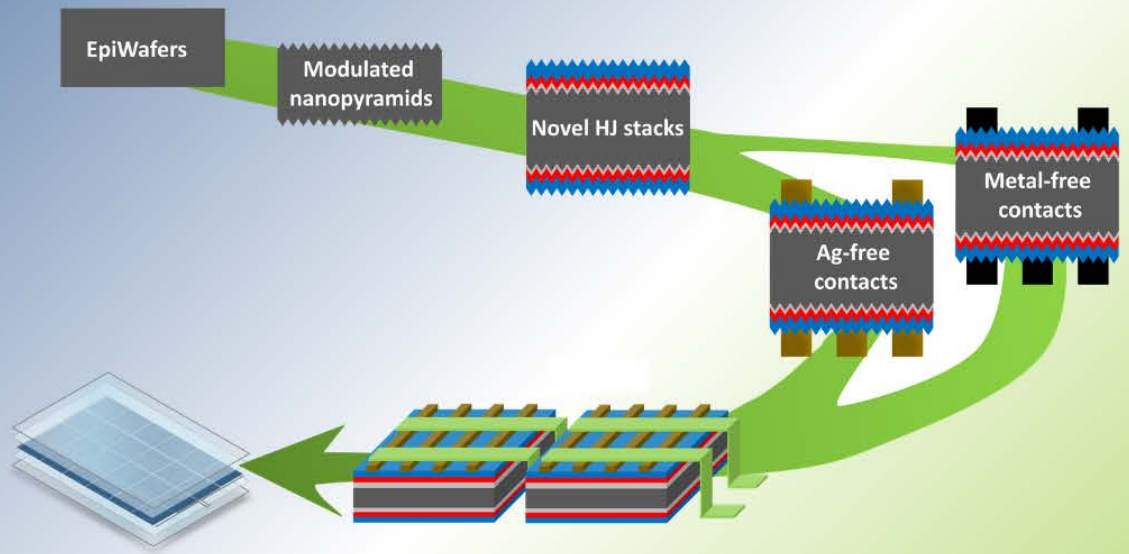
Start date: 1-5-2024

Duration: 36 months

Grant number: 101147275

EU funding: € 3,379,462

“A novel lean process chain for the next generation of sillicon heterojunction solar cells for TW-scale production”



MISSION

SiLEAN is a 3-year project addressing key challenges such as the high energy and material requirements for Si wafer manufacturing, limited current generation, and the use of scarce materials like silver, bismuth, and indium.

In the project, a lean process chain will be developed for the next generation of silicon heterojunction (SHJ) solar cells. Our strategy involves utilizing epitaxially-grown wafers that require less energy, developing alternatives to the highly absorptive hydrogenated amorphous silicon for passivation and carrier-selective contacts, creating indium-free contact layers and silver-free metallization concepts, and implementing bismuth-free interconnection methods.

Our goal is to achieve solar cell efficiencies greater than 25.5% and module efficiencies over 23.5%, while reducing Si wafer and contacting costs by 50% and lowering the carbon footprint by up to 75%.

EXPECTED OUTCOMES

- Si wafers with thickness <100 µm and advanced light-management archtecture for optimal efficiency trade-off.
- Solar cell efficiency >25.5% using ZnO-based TCOs and Ag-free metallization.
- Design of innovative SHJ mini modules with energy-conversion efficiency >23.5% paving the way for terawatt-scale production.
- A 50% reduction in manufacturing costs, making the process compatible with mass production.
- Full life-cycle analysis to assess the reduction of the environmental impacts and ecological risks of industrialized modules based on the SiLEAN (In-, Ag-, and Bi-free) solar cell technology.