

UNIVERSITY OF MALTA
Institute for Sustainable Energy
Marsaxlokk - Malta



L-Università
ta' Malta

Institute for Sustainable Energy

Aims:

- Research in energy related topics
- Specialised and overview courses
- Dissemination of best practices in energy conservation, installations and use of related technologies
- Design, adapt and develop guidelines for sustainable energy technology in local conditions
- Recommendations on energy policy development and implementation



Areas of Research

- Solar photovoltaic system and semiconductor material research
- Offshore PV systems
- Energy utilisation and energy efficiency
- Energy performance and indoor comfort of buildings
- Solar heating and cooling
- Wind resource assessment and related studies
- Shallow ground geothermal energy
- Energy storage
- Energy policy



Courses, Study Units & Services

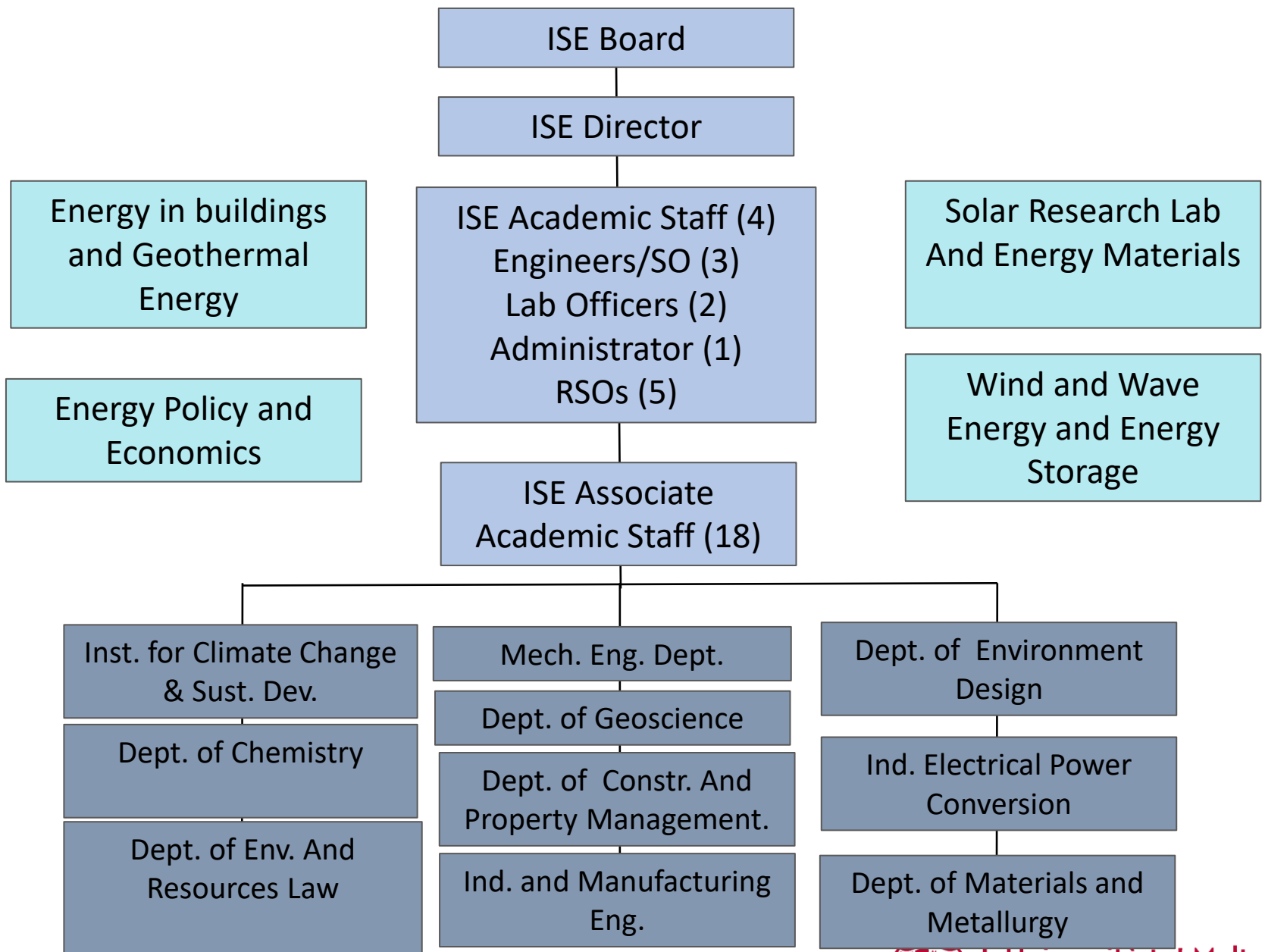
- F/T and P/T taught M.Sc. in Sustainable Energy
- F/T and P/T M.Sc. by research
- F/T and P/T PhD
- Service modules to other Departments
- Small-scale solar installers certification course
- Technical Visits to Installed Solar Systems



Staff and Students

- Four full-time academics
 - Eighteen Associate academics
 - Two Systems Engineers and a Scientific Officer
 - Two Lab officers
 - One full-time administrator
 - 5 RSOs
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- MSc by research (full-time)
 - MSc taught course (full and part-time)
 - PhD students by research (full and part-time)





The Site and the Lab



Complete equipment set for: - Characterizing solar materials and devices
- Making thin film solar cells

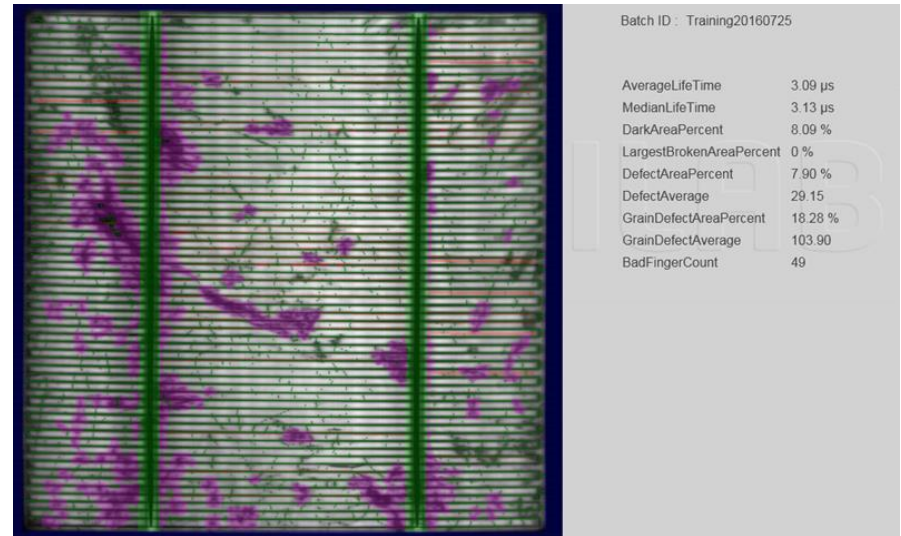


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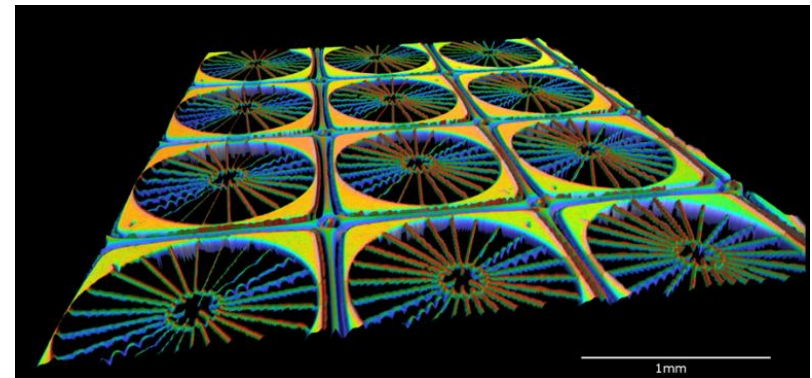
Capabilities

Characterization:

- Laser scattering tomography
- Photoluminescence
- Electron Lifetime
- Surface Photo Voltage
- Raman Spectroscopy
- High Resolution IR Imaging
- FTIR
- 4 point probe
- Optical Microscopy
- Atomic Force Microscopy
- Spectroscopic Reflectometry
- Ellipsometry
- Flash tester
- IR Cameras



Minority carrier lifetime measurement in silicon solar cells



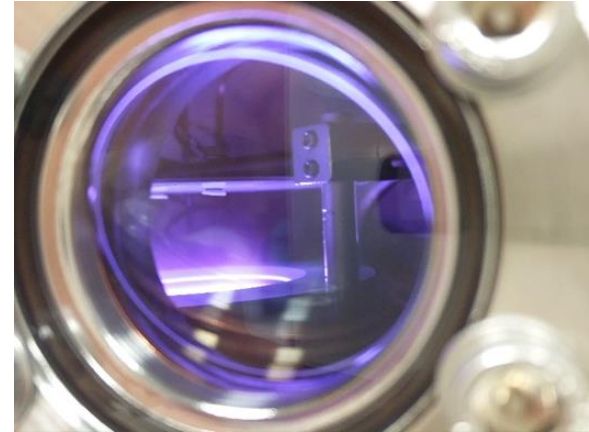
White light interferometry of space-grade 3 junction
GaAs/GaInP/Ge high efficiency solar cells



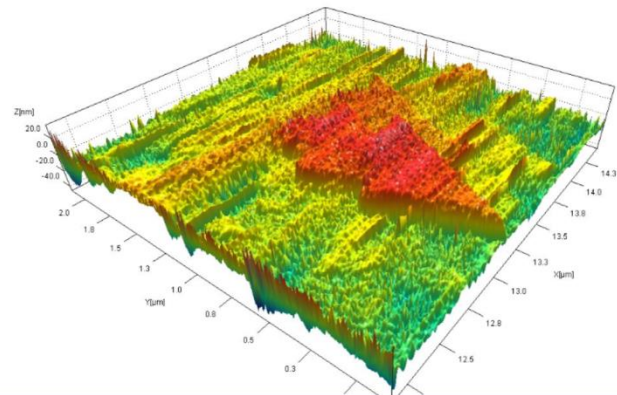
Capabilities

Processing:

- ▶ Thermal Annealing Furnace
 - ▶ Quartz tube Doping Furnaces
 - ▶ Dual Magnetron PVD
 - ▶ Plasma Enhanced CVD
 - ▶ Wet processing laboratory
 - ▶ Nano layer Spin coater
 - ▶ Ion Beam milling station
 - ▶ Silk screen printing
 - ▶ Automatic polisher
 - ▶ TEM Dimple grinder
 - ▶ 3D scanner and 3D printer
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- ▶ Strong collaboration with Industry



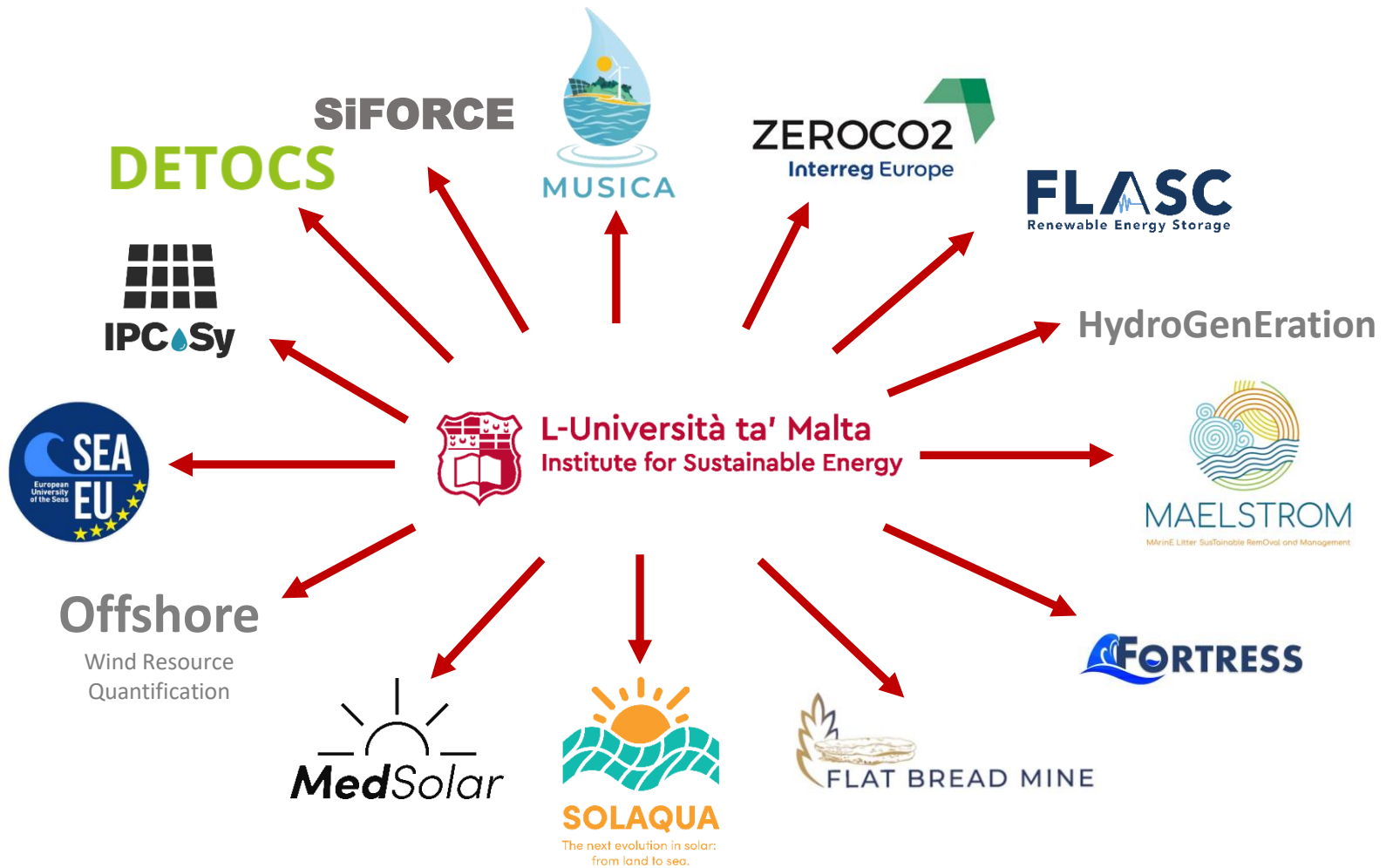
High vacuum plasma assisted magnetron sputtering of a metal alloy for the provision of an electron transport layer with tailor made sheet resistance



Atomic Force microscopy of PVD deposited 20 nm Al film



Active and Recent Projects



DEcarbonising the TOurism Industry Post Covid-19 Support - DETOCS

- 13 partners, 2M Eur project
- A strong need to address policies in terms of support that will be provided to the tourism sector
- Support mechanisms for energy efficiency in tourism infrastructure will:
 - decrease energy consumption,
 - improve the carbon footprint,
 - decrease energy bills and
 - put the tourism sector on the path to decarbonisation
- <https://www.um.edu.mt/projects/detocs/>

Interreg
Europe



Co-funded by
the European Union

DETOCS



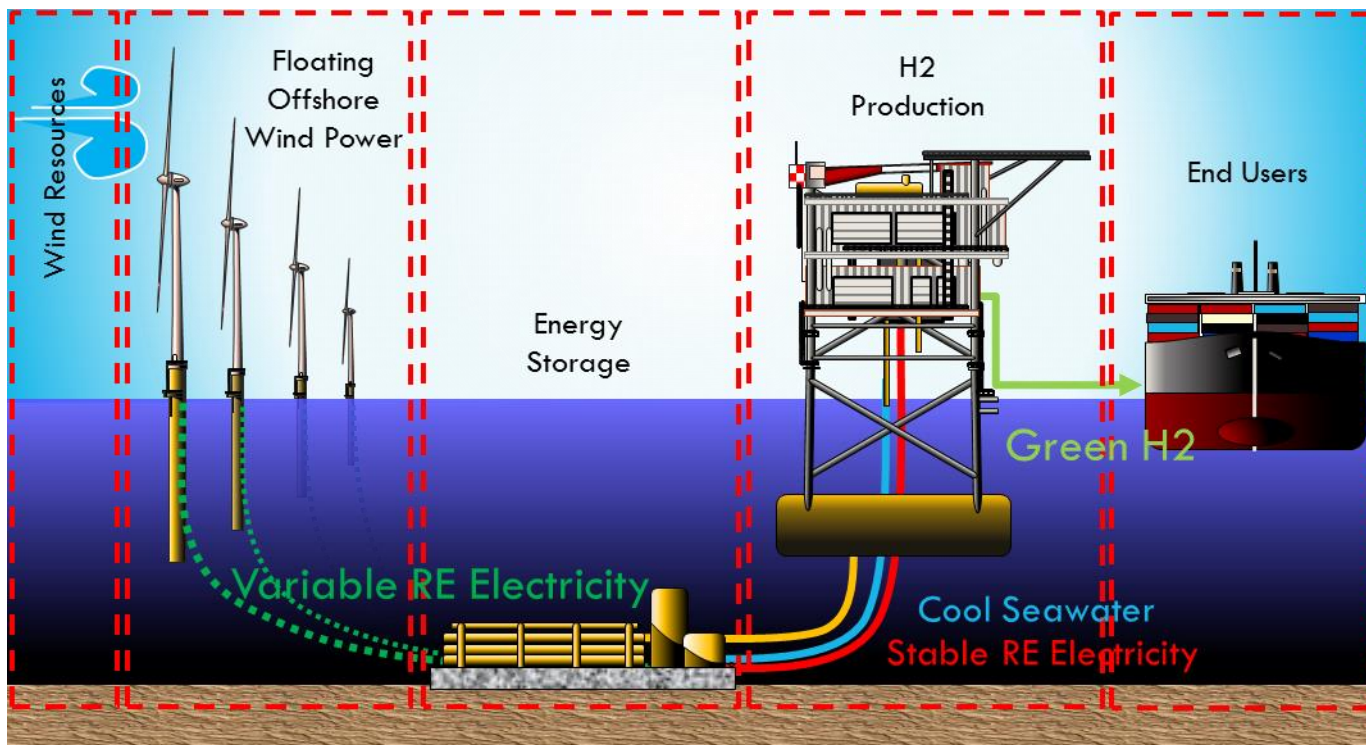
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HydroGenERation - Hydro Pneumatic Energy Storage for Offshore Green Hydrogen Generation

Integrating FLASC with Hydrogen Generation

- EWA 64/22

Institute for Sustainable Energy, Department of Mechanical Engineering & FLASC B.V.

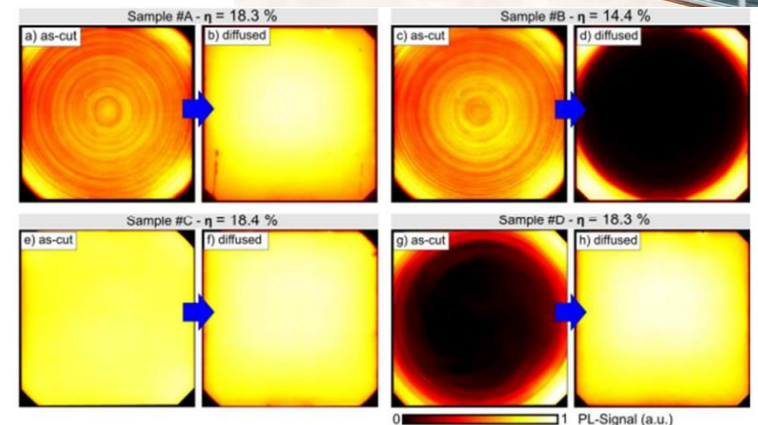


SiForce –Silicon Improvement for Higher Efficiency Solar Cells

- understanding the impact of the various types of defects on solar cell efficiency
- Experiments will be conducted with engineered materials
- First samples have been grown and are being analyzed.
- In collaboration with ODTU GUNAM and Kalyon PV

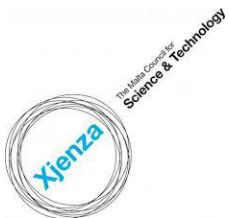


“Quality control of Czochralski grown silicon wafers in solar cell production using photoluminescence imaging”, Jonas Haunschild, Juliane Broisch, Isolde E. Reis, Stefan Rein, 26th EU PVSEC, Sept 2011, Hamburg.



Solaqua – Offshore Solar

- Three phases – 2012-2021
- Aim is for an offshore system that can survive 20 years and be cost competitive with land-based-systems in islands and large cities.
- Design validated in simulation and wave-tanks
- Patent application
- Preparing for last phase – full-scale testing in Maltese waters
- Also received serious interest from foreign companies.



TAKEOFF
THE ENTERPRISE CAMPUS



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Research Outcomes

- Publications, collaborations
- 3 patents filed in 2023 (Ipcosy, Solaqua, MEDSolar)
- Part of startup (FLASC)
- Planned startup (Solaqua)
- 3 Innovation awards
- International recognition

Thank you for your attention

For further information or to explore cooperation or collaboration contact us:



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