



Si Material

ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development.

Realization Line for high efficiency cost effective cSi Solar Cells

Location of the infrastructure : Rome, Italy

<http://www.casaccia.enea.it/sicri/>

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Objectives : High efficiency crystalline silicon solar cell production and characterization

Main features : The Research Infrastructure covers all the intermediate steps in cells production, from the wafer to the complete device.



The facility is focused on the following specific **topics**:

- Screen printing

High resolution screen printing (< 100um) for enhancing the industrial techniques commonly used for solar cells metallization, with optical recognition and high resolution screen printing. Screen printing is also used to deposit dopant-containing pastes on silicon wafer surface, useful for selective emitter formation.

- Open tube furnace.

Three open tube quartz furnaces for diffusions, wafer Ø 8" for diffusion , oxidations and annealing. Such equipment is used to realize conventional and selective emitter structure.

- Laser Processing

The line is used to produce selective emitter by depositing, on the wafer surface, solid dopant sources. Processes are performed using a Nd-YAG laser, working at 1064 nm or 532 nm. The second harmonic (532 nm) is used for selective doping, while fundamental wavelength is used to get effective grooving of silicon for buried contact cells. Laser processes can also be used for the fabrication of localized contacts on the back surface of the cells when the metal layer is separated from the semiconductor by a passivating insulator layer.

- Heterojunction a-Si:H/c-Si structure.
- The lab gives access to all **characterization techniques** on cSi material and devices

Limitations or constraints : The access will be allowed with technical and scientific assistance from Enea.

Typical services or results : The structure can be used by both researchers and students. The first ones to realize specific samples for the development of innovative process step and characterization; the second ones to be trained on realization and characterization of high efficiency cost effective solar cells

Examples of research projects : The facility was used on many FP EU funded research projects: in 6FP Lab2Line – (www.virtualfab.eu) which aims to transfer, in industrial environment, the screen printed/buried contact technology, developed during years in ENEA has been reached 18% efficiency on BCSC structure.