

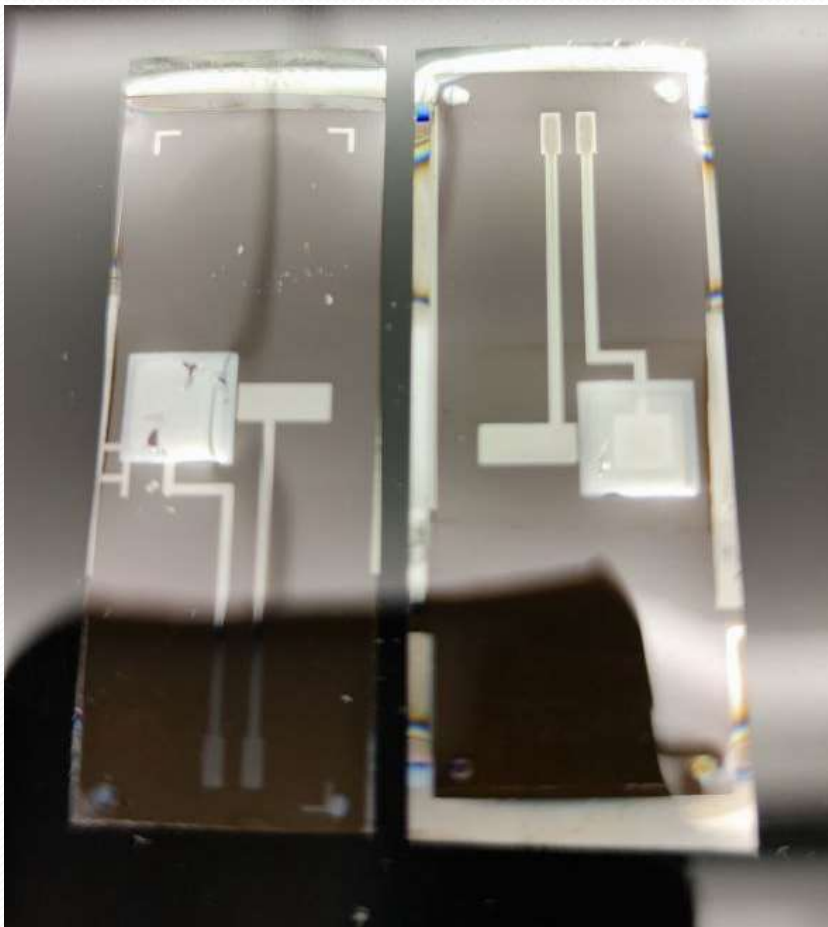
WP1 Activities and Schedule until dec.2022

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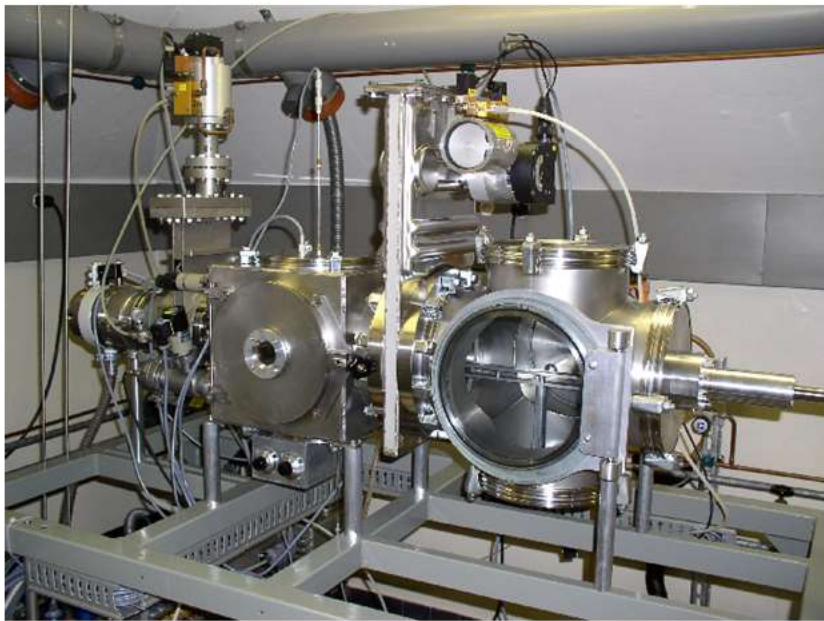
Fabrrication activities at EPFL



- Main Activity: Fabrication of p-i-n and CSC using PECVD
- Need to share its work with the 3D-SiAm experiment
- Connection with metal bridge
- Experienced various failures due to delamination
- By the end of 2021 a first batch of p-i-n single diode is expected
- By the end of 2022:
 - Within March /April Various batches of p-i-n devices and CSC with single diodes are expected
 - Within September First batches of diode arrays both in p-i-n and CSC configurations

The reactor at EPFL

PE-CVD system for a-Si:H

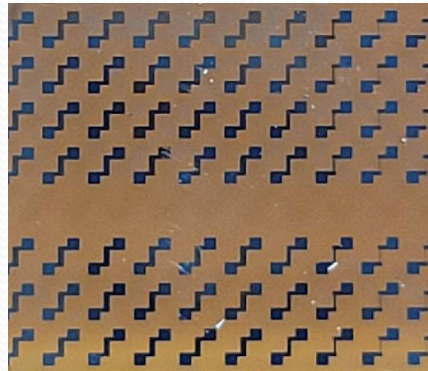


- IMT designed system
- Single chamber PE-CVD system
- load-lock
 - Higher throughput
 - Transfer of sample to load lock between layer deposition (chamber cleaning)
- Substrates:
 - size up to 6"
 - or up to 9 4x4 cm² substrates
- Operated at VHF frequencies (50 – 150 MHz)
- Deposition rates up to 20 Å/s

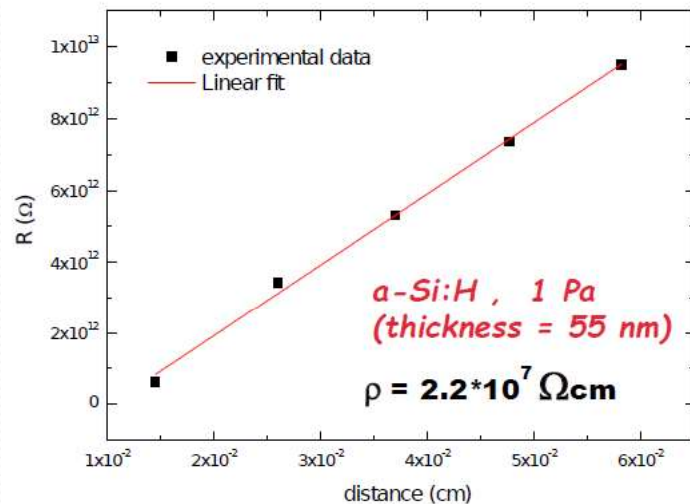
Fabrication and characterization activities at Unisalento-INFN-LE



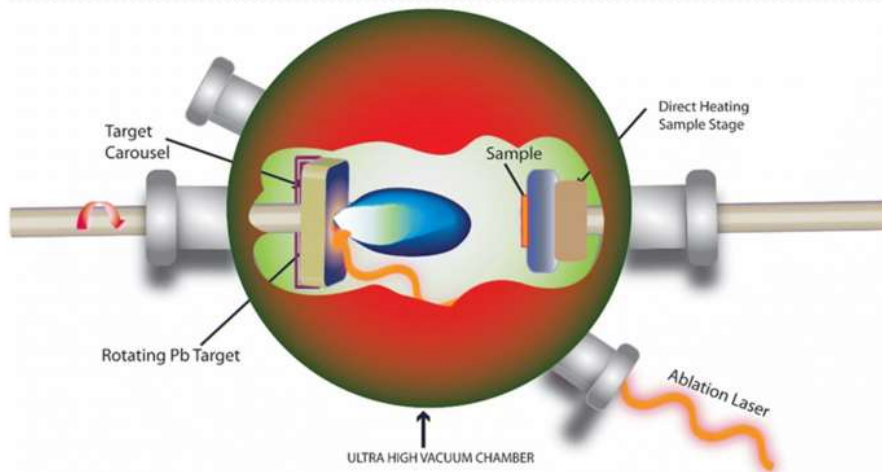
- Deposition of a-Si:H by PLD
- Lithography and metallization facility for devices and substrates
- Metal deposition for PI substrates
- Basic semiconductor characterization TE
- Superconducting magnet for mobility measurement
- Tandem accelerator for testing and irradiation
- By end of 2021 they will complete the study on Hydrogen pressure versus resistivity
- By May 2022 they will build the first p-i-n structure. By the end of 2022 they will complete the first CSC structure



Resistivity studies at Lecce



Sample	Thickness (nm)	ρ (Ωcm)
S1_1 Pa H	55	$2.2 \cdot 10^7$
S2_0.1 Pa H	50	$8.3 \cdot 10^5$
S3_0.01 Pa H	40	$5.6 \cdot 10^5$
S4_0 Pa H	70	$1.5 \cdot 10^4$



Resistivity of n-doped a-Si:H 73 ohm cm
 Resistivity of p-doped a-Si:H xxohm cm

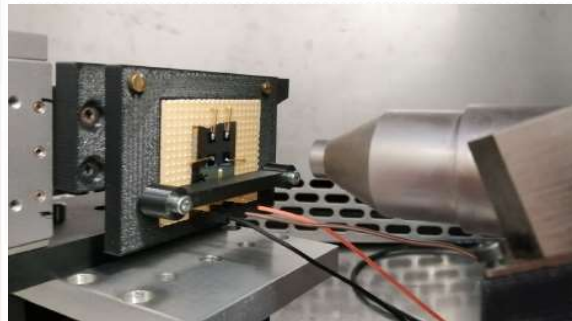
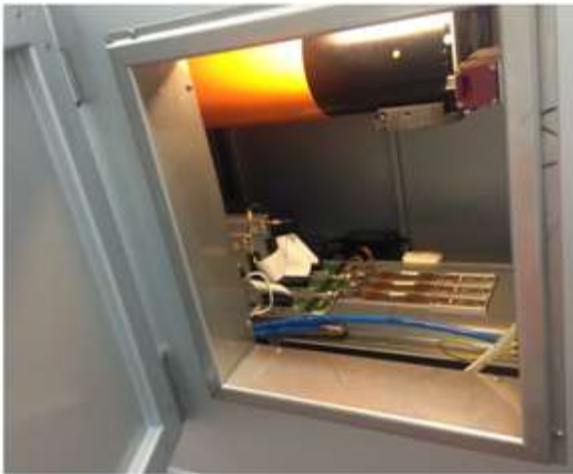
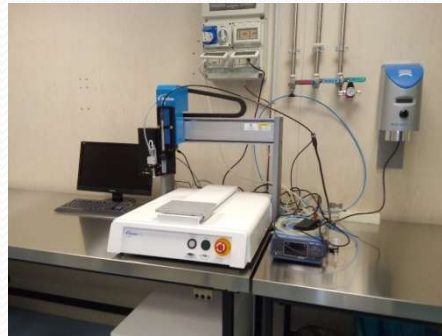
Mobility versus temperature measurement



Performed using the superconductive magnet in Lecce.

The measurement will be performed in a-Si:H samples produced with PECVD and PLD

Characterization tests and assembly in Perugia I



The components from the two production centers will be characterized with the test station TS2000SE and tested with x-rays locally. Subsequent test with electrons will be performed in surrounding hospital facilities. Protons for testing and irradiation will be performed in collaboration with Lecce. The samples can be assembled in the local clean room.

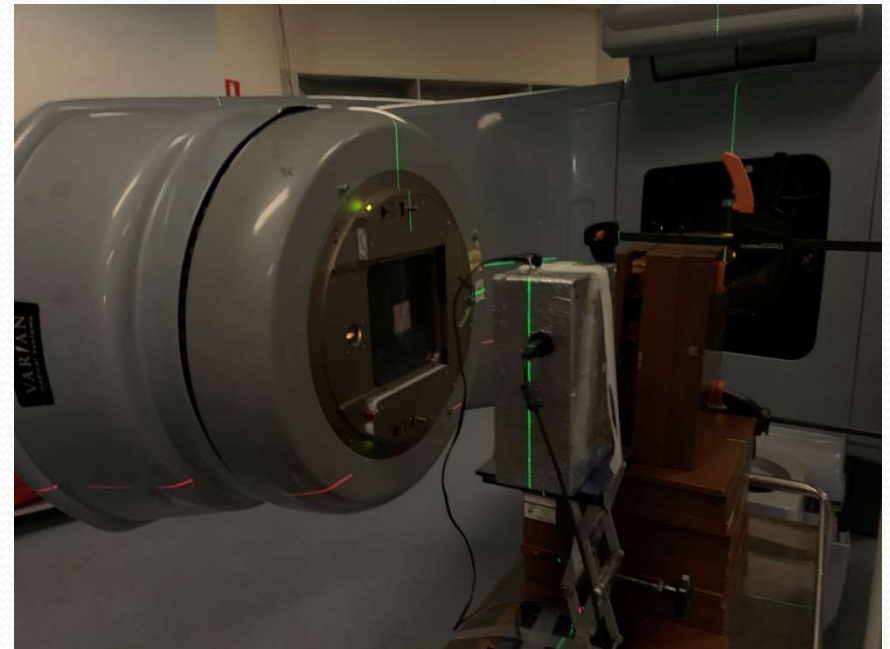
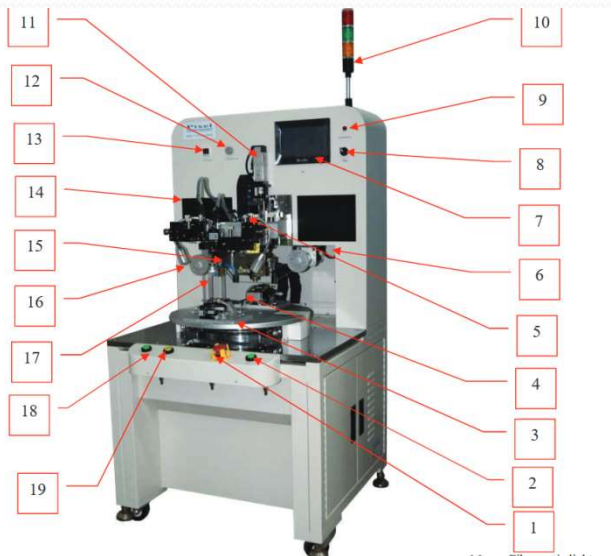
Characterization tests and assembly in Perugia II

- Soon available:
 - an Infrared spectrometer for Hydrogen content measurement
 - Xe lamp spectrometer for defect density measurement
- Defect density measurement also available at ELECTRA (TS)

Characterization and assembly at UoW



In House: I/V, C/V, Alpha particles, facility for chip bonding directly into PI
At ANSTO (near Wollongong), IBIC with protons and Alpha 20 MeV $2\mu\text{m}$ spot, Co-60 source 1.2 kGy/h, X-ray tube 20 keV-320 keV
At ANSTO (Melbourne) Synchrotron (SL) 60-120 keV, 25 kGy/s





Conclusions

- We are producing early prototypes of p-i-n devices in kapton at EPFL
- We are depositing a-Si:H in kapton for preliminary testing in Lecce
- In our testing facilities we are ready to test the prototype device in single diodes and also in 2 x 2 arrays, we are preparing to test larger arrays