TFSC

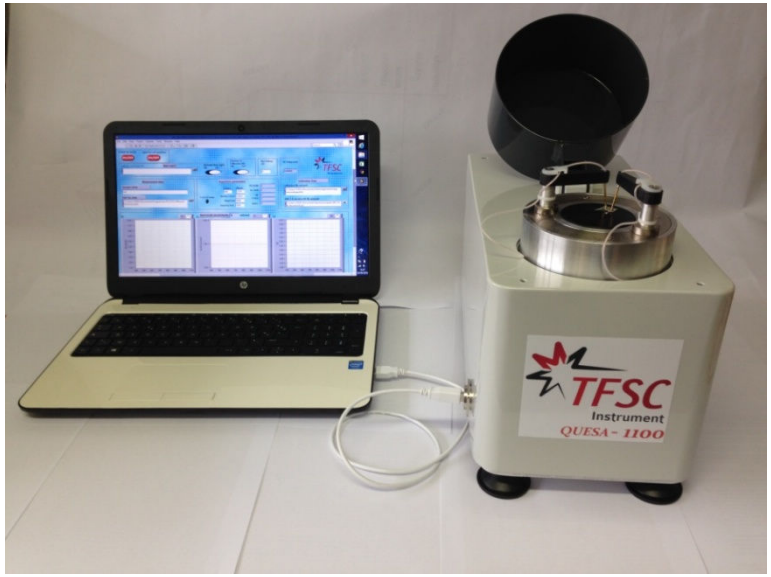
Instrument

QUESA-1100: Technical note

QUESA-1100

All in one: complete EQE and I(V)

With all the advantages of conventional EQE system without its disadvantages



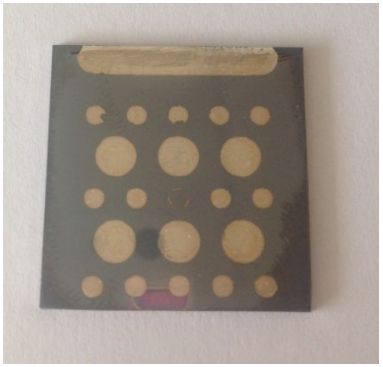
Comparison of EQE and I-V measurements

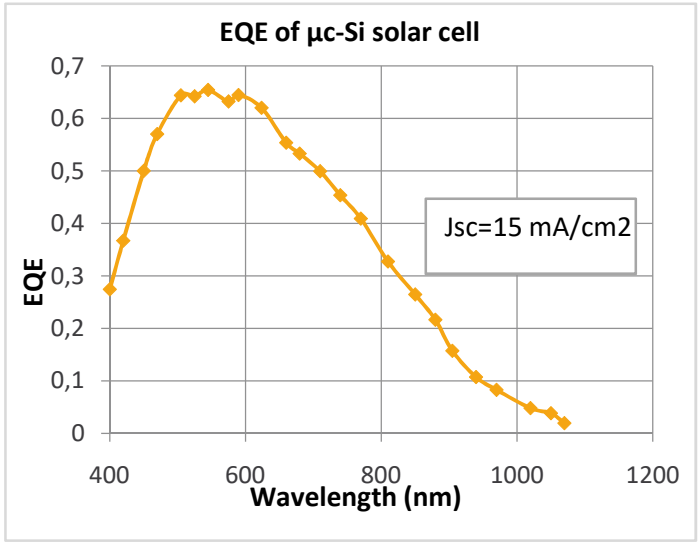
Measurement procedures

- Use of 4 different Solar cells having different absorption profiles:
  - 1) Thin film amorphous silicon type (a-Si): optical gap ~1.6 eV
  - 2) Thin film micro-crystalline silicon type (µc-Si): optical gap 1.1 eV
  - 3) monocrystalline silicon type (c-Si) : optical gap ~1.1 eV
  - 4) Reference monocrystalline silicon type (c-Si-ref): optical gap ~1.1 eV
- Measure EQE and RS:
  - Deduce Jsc from RS integration with AM1.5G solar spectrum
- Measure I-V curve with solar simulator option
  - Measure the I-V curve and deduce Isc, Voc, FF, R-serial, R-shunt and η
  - Deduce Jsc at the illumination power
  - Deduce Jsc @ 100 mW/cm²
  - Compare the Jsc measured by EQE with the one measured by I-V

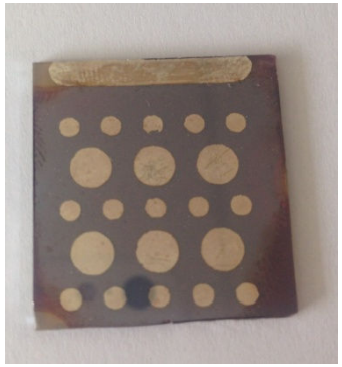
EQE results

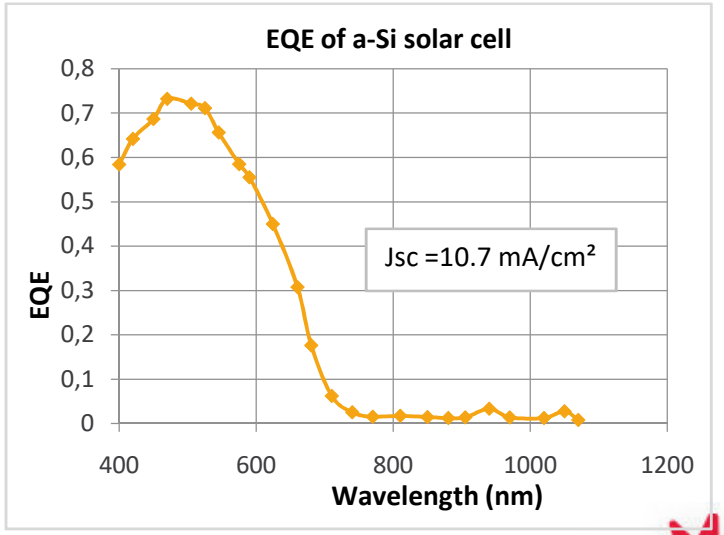
µc-Si





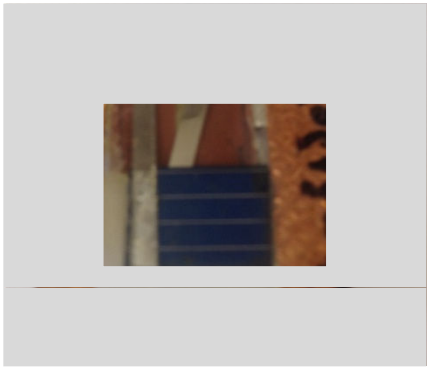
a-Si

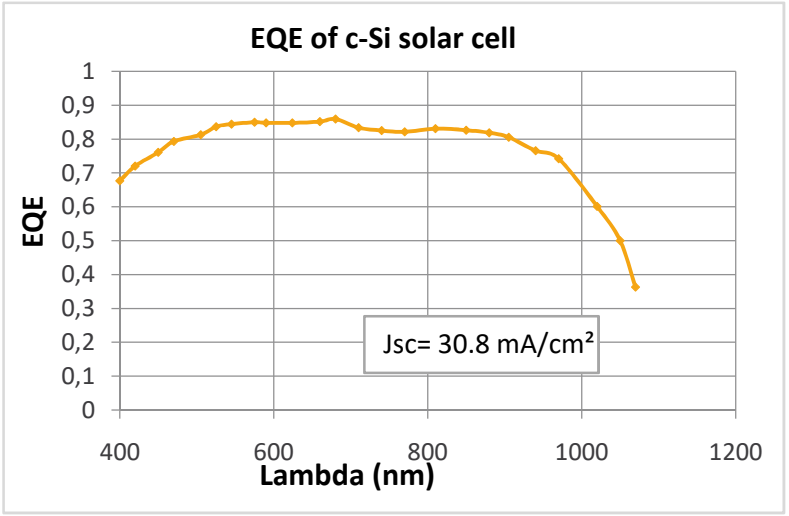




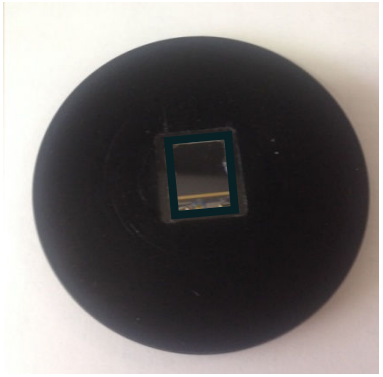
EQE results

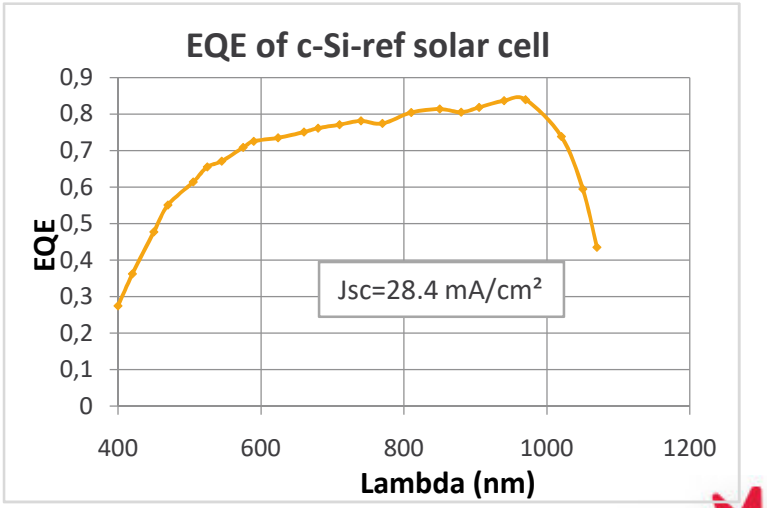
c-Si





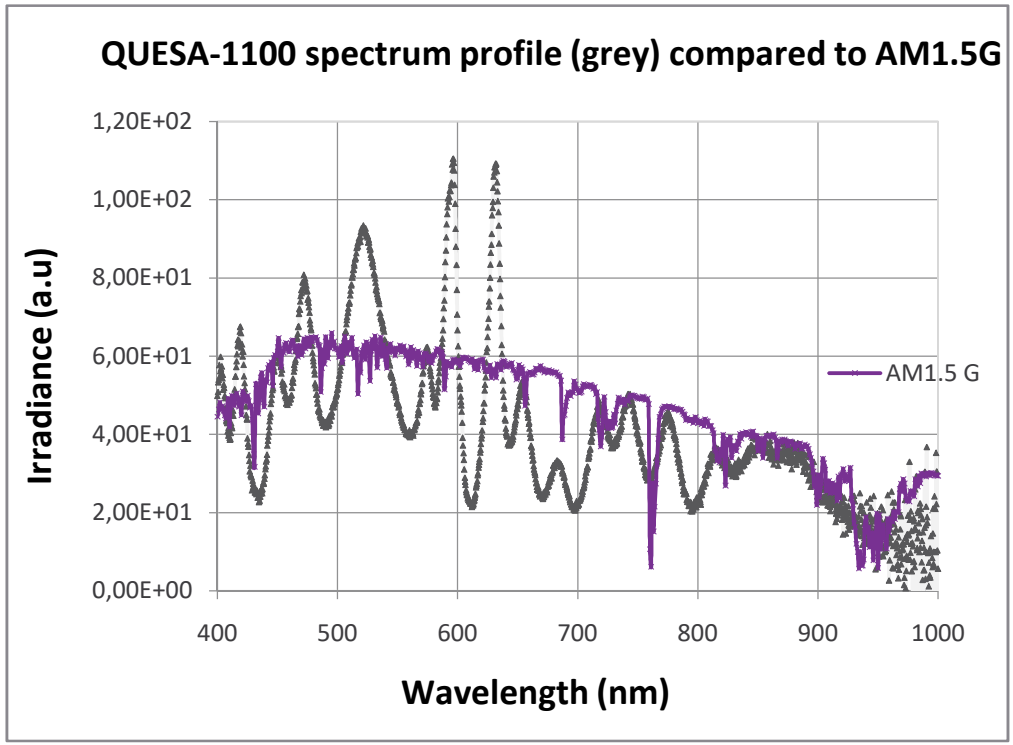
c-Si-ref





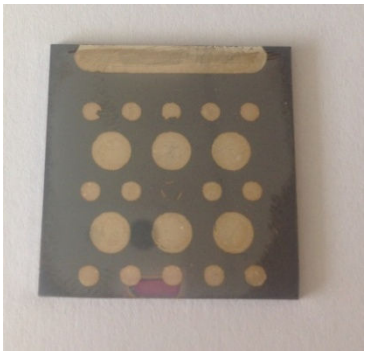
I-V measurement: spectrum profile

- The spectrum has been adjusted to match as much as possible the one of AM1.5G
- The comparison gives a spectrum with Class A according to IEC norms
- The global power of this spectrum is 620 W/m² for the range of 400 nm to 1100 nm
- It's know that one sun correspond to 750 W/m² for the range of 400 nm to 1100 nm
- This gives a power of 620/750=0.83 Sun
- This spectrum configuration has been used to measure I-V curves on the 4 different cells.
- The parameters used are : illumination area (0.071 cm²) and the irradiataion of 620 W/cm²

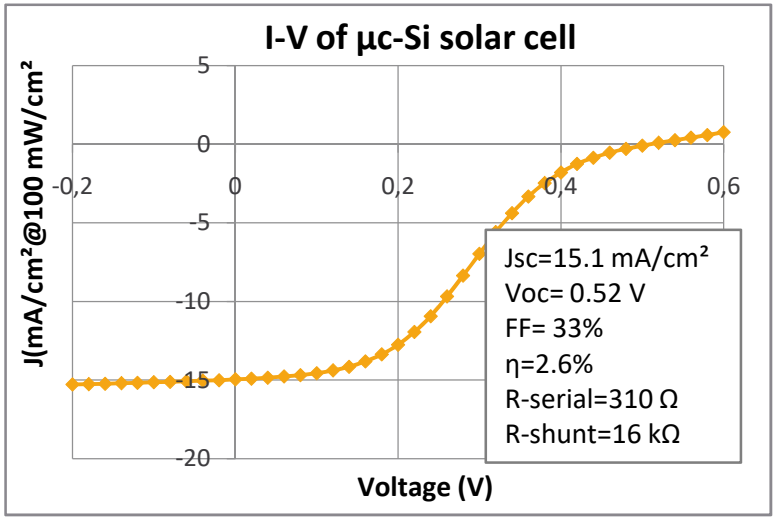


I-V results: I

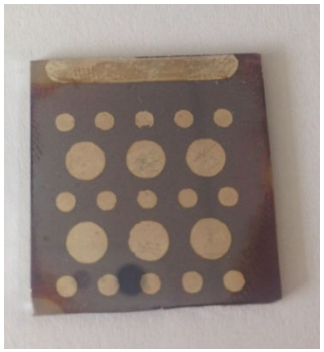
µc-Si cell



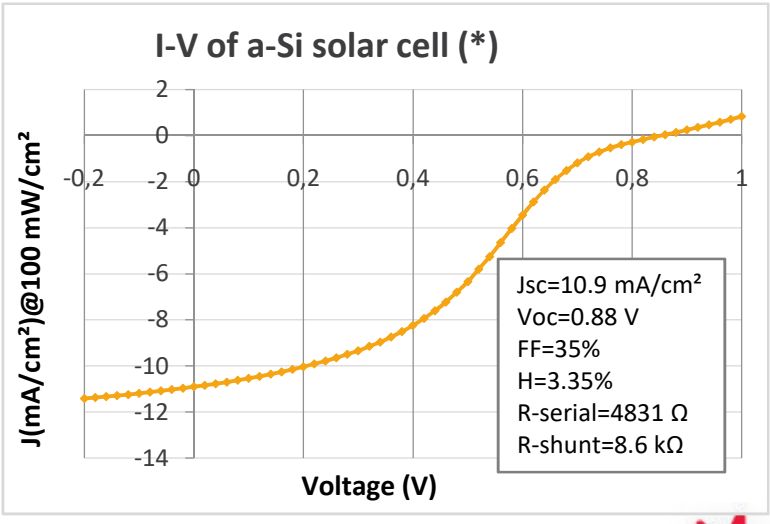
*This cell present an "S" shape probably due to interface or interlayer matching issue



a-Si cell

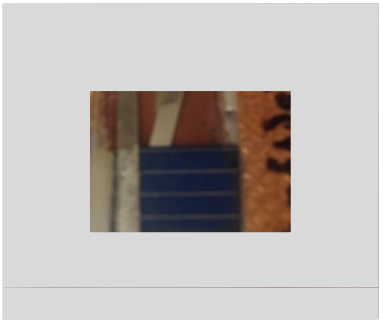


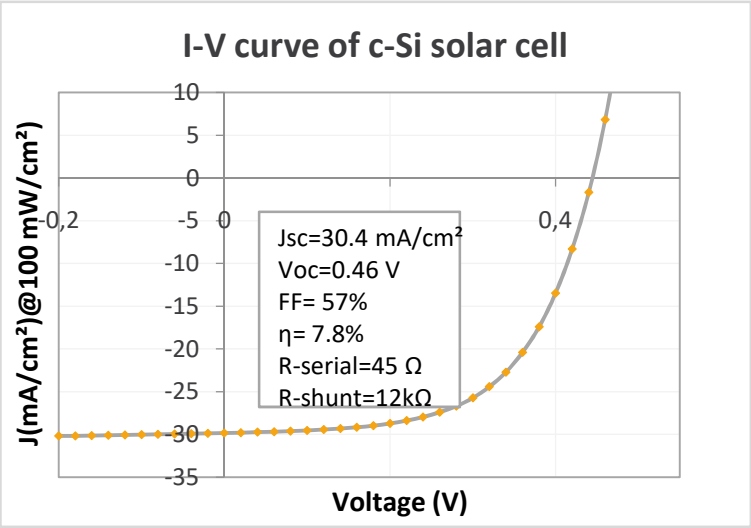
*This cell present an "S" shape probably due to interface or interlayer matching issue



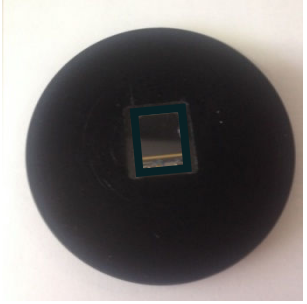
I-V results :II

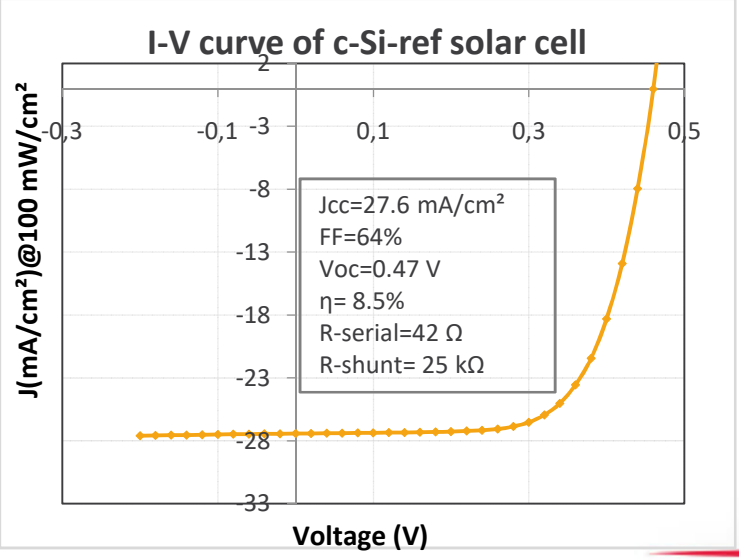
- c-Si





- c-Si-ref





Comparison I-V and EQE

Cell	a-Si	µ-Si	c-Si	c-Si-ref
Jsc(I-V) (mA/cm²)	10.9	15.1	30.4	27.6
Jsc(RS) (mA/cm²)	10.7	15	30.8	28.4

- **The I-V and RS(EQE) measurement are giving similar results when applied to different solar cell having different absorption profiles**