



Final Nanophoto Meeting

Introductory notes

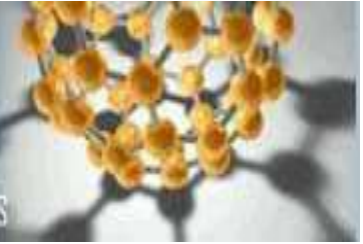
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Como, 21-22 November 2008



NANOcrystalline silicon films for

PHOTOvoltaic and optoelectronic applications



The primary aim of this research project was to develop computational tools capable of assisting the design of a new nc-Si growth process with a Low Energy variant of a Plasma Enhanced Chemical Vapour Deposition (LEPECVD) reactor, addressed at the deposition of high quality nc-Si films for both photovoltaic and optoelectronic applications.

The dissemination and the possible industrial transfer of the results was the ultimate goal



by means of:

- the **modelling** of the LEPECVD reactor, looking at the reactor fluidodynamics and at the kinetics of the chemical reactions in the plasma phase and at the surface.
- the **modelling, design and optimisation** of the film growth process, addressed at the identification of a set of critical parameters for the optimisation of the structural properties of the material (shape, size, size distribution and mutual nanocrystals orientation)
- the **modelling** of the micro/nano structure of the nc-Si films, looking at the effect of the nc-Si/a-Si ratio and of the local strain on the electronic properties
- the **growth of nc-Si films** and their structural, electrical, optoelectronic and environmental characterization
- The **fabrication of a pin device** to be used as prototype PV cell and electroluminescent device



Achievements

- The set up of a full 2D plasma reactor modeling
- The development of atomistic base- modelling of the crystalline vs amorphous growth
- The set-up of a plasma diagnostic system
- The development of novel characterization techniques