Strength of Switzerland for PV

- A strong expertise in machines, processes, automation
- A good network of academic and research institutions
- Visionary people and projects

→ good starting technological position

In 2010 over 2 billions CHF PV products export!

- CH attractive for qualified personal
- « seed money » for industry-research collaboration (CTI)

Potential for CH to become a « PV Technology Hub »
Le rôle de la recherche dans le photovoltaïque

Exemple du PV-Lab de l'IMT à Neuchâtel

Fondé par Prof. A. Shah 1984

Switzerland

Neuchâtel

EPFL
Jusqu’au 31.12.2008, Université de Neuchâtel
PV seen from IMT ...

- **Public research**
  - ETH domain (EPFL, EMPA, PSI)
  - HES (Supsi, ZAHW, Bern, Buchs)
- **Industry R&D** (Oerlikon, R&R CH, Dupont, Flisom, …)
- **Equipments makers**
  - (Oerlikon, MB, AMAT CH, 3S, Pasan, Schneeberger, Essemtech, Comax, …)
- **Components / consumables**
  - (Sputnik, MC, SSF, Studer, Metalor Solaronix, …)
- **Production**
  - Flexcell, Pramac, Swiss Wafer, 3S, SES, …
- **Other various**:
  - Indeotec, Ideal Chimic, …

En lien contractuel direct avec l’IMT

Prime Energy, 4.10.2011
PV-Lab: example of valorisation, Neuchâtel

- Micromorph cells on glass
- Cells on plastic foils
- High efficiency devices
- Building of own R&D tools
PV-Lab: exemple of valorisation, Neuchâtel

- Production lines for micromorph modules on glass
- Manufacturing of flexible PV foils
- Production tools for high eff. Crystalline -Si cells
- Start-up company for R&D tools
Some examples of partnership with industry

With Solneva AG
Innovative laser scribing systems

With EssemSolar AG
Screen-printing systems

With Pasan
Illumination systems
Some examples of partnership with industry

With 3S Moduletec
Lamination processes

With Dupont CH
Novel
encapsulation
materials

With Bosch DE
Solar cell process

And more with IBM, Solvay, Metalor, Tetrasun, Gadir, Photosolar…
Valencia EU-PVSC 2010
New world record micromorph at 11.9%
(Paper Oerlikon-PVLab)

Oerlikon Solar announced Production lines with 0.5 €/Wp possible at 10%
Micromorph modules
Heterojunction crystalline solar cells

Since 2005 a new activity developed at IMT Neuchâtel

- Excellent passivation with a-Si layer!
- Low temperature processing!
  - compatible with thin wafers
  - low wafer breakage
- Simple structure and simple process!

With an ultra-simple process
Similar to thin film coating
Heterojunction solar cell results at IMT-EPFL

KAI-M, large-area industrial reactor, 40x50 cm² VHF (40.68 MHz)

OCTOPUS cluster from Indeotec SA R&D reactor, 13x13 cm² (13 – 100 MHz)

21 %

20.6%

2x2 cm² cells

Master > 20% cell with fully industry compatible process
Large area Cz screen printed cell with 20% efficiency with industry compatible process!
Large area tools at Hohenstein-Ernstthal, Germany

PECVD large area tool

1st good results of in/ip passivated FZ polished wafer in large area pilot tool!

Opportunities for a high end production line in CH?