Shell Global Solutions

Solar Cell Research in the Netherlands

Annual Dutch Solar Cell R&D Seminar

and

Start of FOM-CW-Shell Joint Solar Programme

Contents of the day

Two events in one:

1) Annual Dutch Solar Cell R&D Seminar

2) Introduction to the new 3 M€ FOM-CW-Shell Joint Solar Programme (JSP)

Driver behind JSP Programme

- Solar power is currently about one order of magnitude more expensive than conventional power
- Incremental improvements of current technology will take a long time to get the cost down if ever
- Breakthroughs are required to speed up cost reductions by volume growth in the market: “from device in niches to mainstream energy provision”

Solar Cells.....

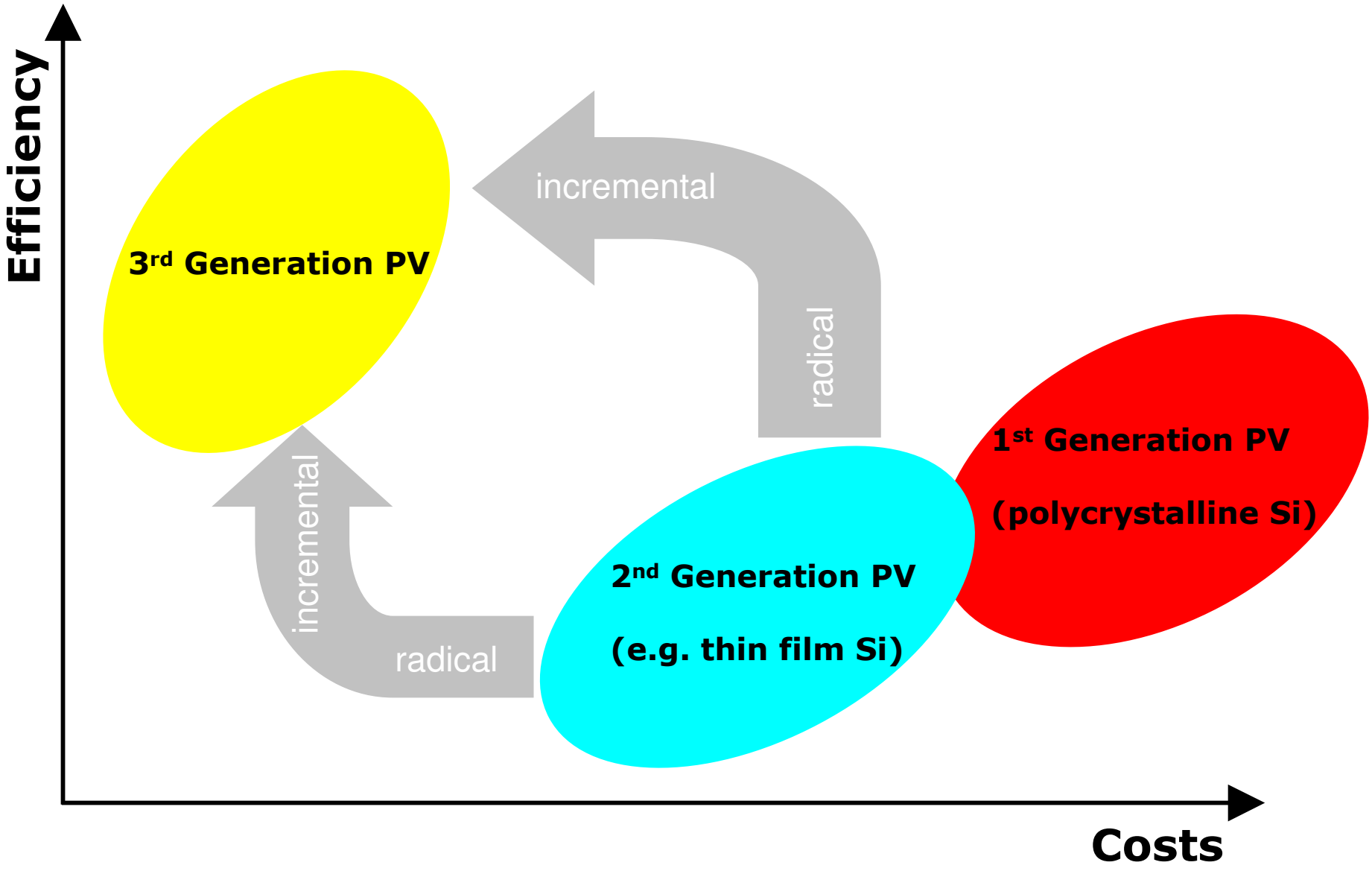
.....the eternal light?

Or this?

Objectives of JSP Programme

- Creating leads for new generations of PV cells with substantially improved characteristics, by exploring new conversion principles, device concepts, and processing methods
- Achieving synergy and acceleration by involving new groups and disciplines in PV related research

Lines of Attack



Structure of the day

- Morning
  - 5 presentations on current approaches
- 57 posters
  - with lunch
- Early afternoon
  - 3 presentations on new directions
- Late afternoon
  - Introduction to Joint Solar Programme by Wim Sinke
  - Forum discussion with chairman Frans Saris
  - Drinks

Backup Sheets

Programme Goals

The programme aims to:

- Create breakthroughs in photovoltaic conversion, by enabling full use of the solar spectrum and of the generated charge carriers in super-high efficiency devices
- Develop materials, processing methods and device structures which are very promising for future low-cost manufacturing
- Researchers are challenged to cross current boundaries, via high-risk, high potential ideas, since the programme should be complementary to existing ones

Some Examples

- Spectrum conversion before absorption (both up and down conversion, reduce losses related to the mismatch between photon energies and band gap energy)
- Intermediate band semiconductors (enable more than one low-energy photon to generate a charge carrier, thereby reducing mismatch losses)
- Multiple electron-hole pair generation per photon
- Real tandem Grätzel cell (improve efficiency at low cost)
- Hot-carrier devices (prevent carriers generated deeper in the bands to fully relax to the band edges)
- Thermophotovoltaic and thermophotonic devices (use of absorbers and emitters with excellent thermal and optical control)
- Stable hole conductors and dyes in solid state dye cells (enable low cost manufacturing routes)
- Stable, all-polymer devices (idem)