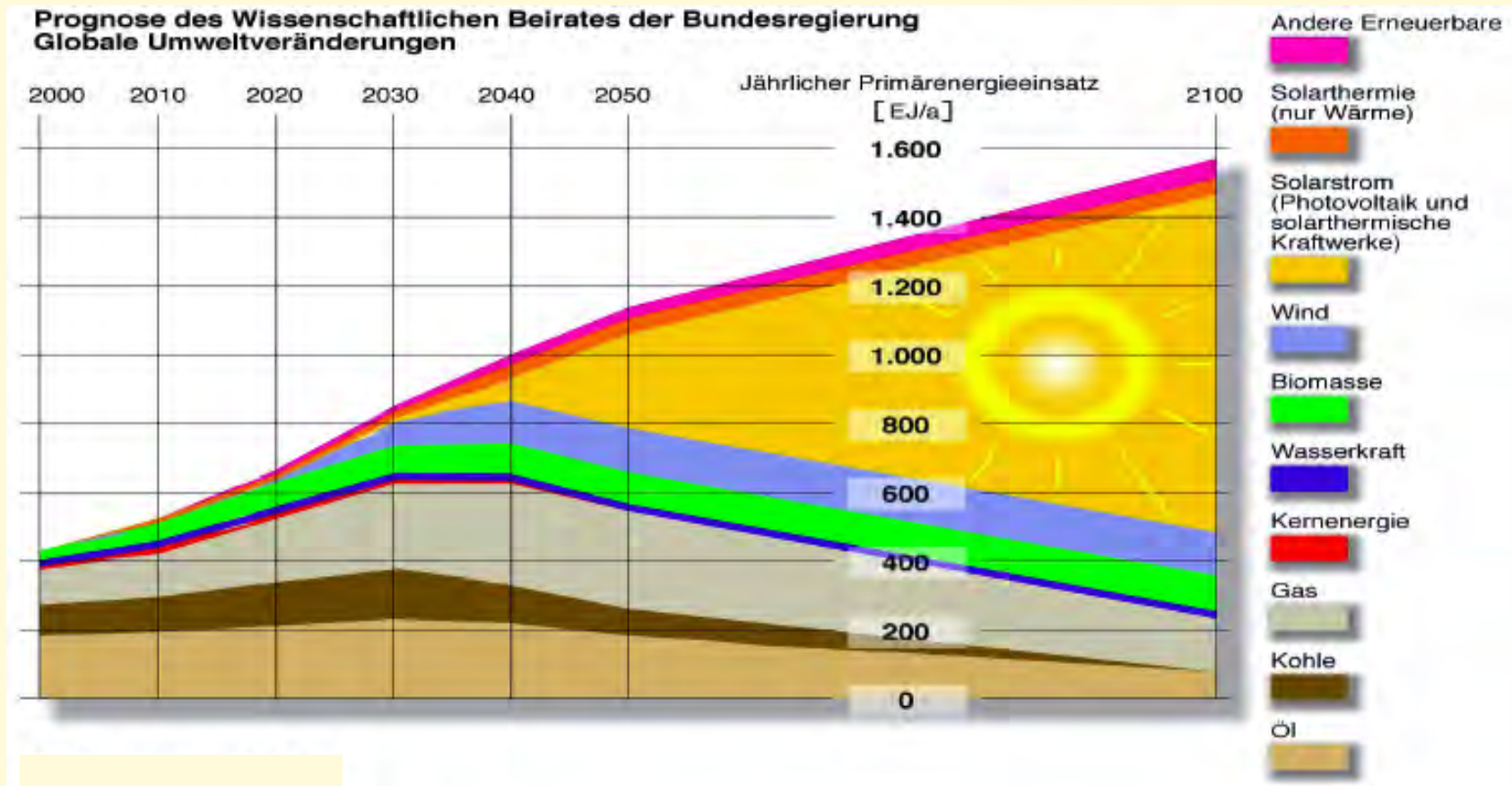




μ

μ

Ilias Garidis  
COO



2





€200 m

2008-2009



+180

μ



+60 MW

μ



500.000

- 1.000

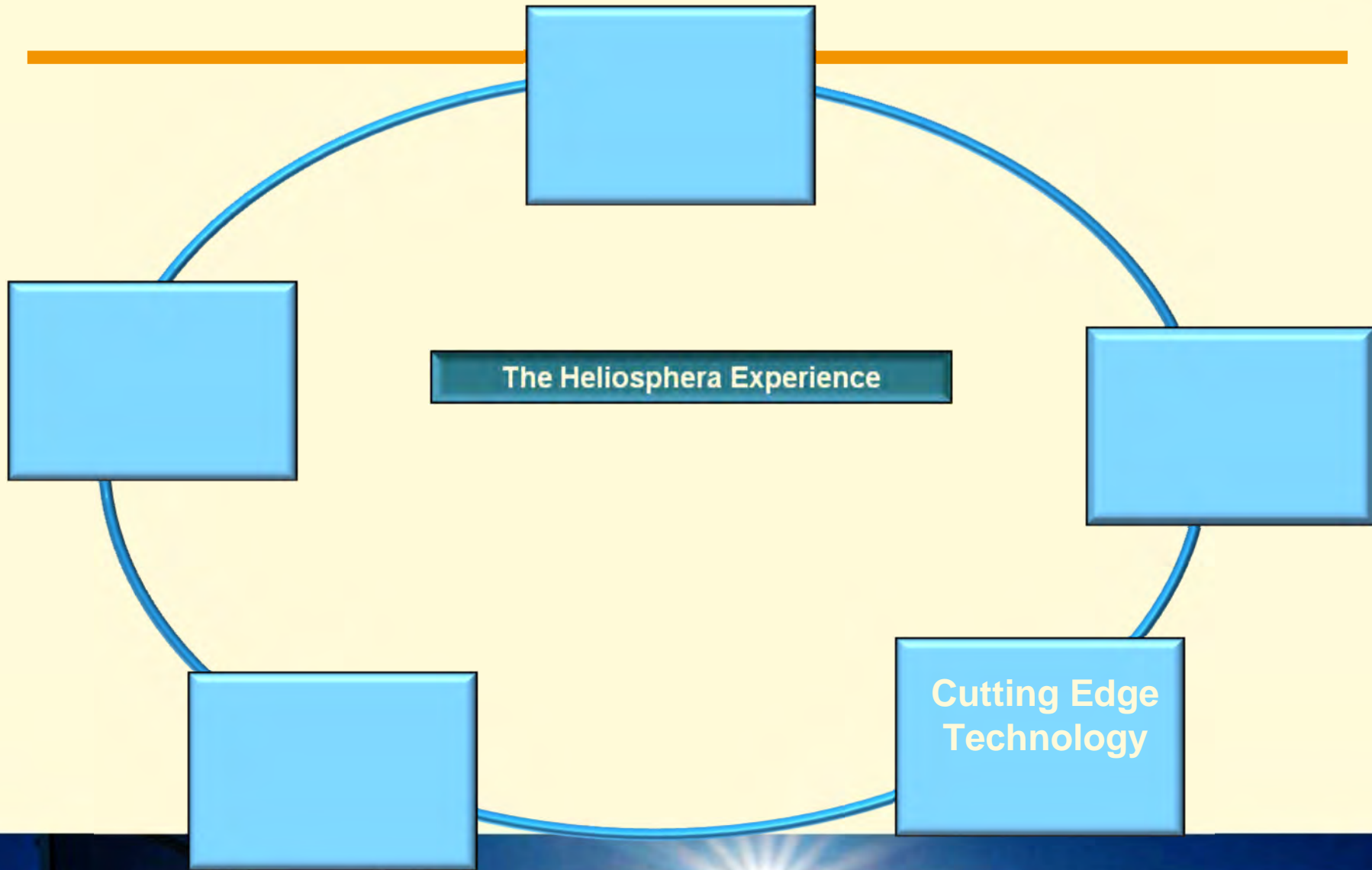
/



~1400

/ μ









**μ**

**State of the art Thin Film micromorph-tandem technology (developed by Oerlikon- )**

- **105, 110, 115, 120, 125, 130 Wp**  
**(-0/+5 Wp)**
- **Double glass laminate (6.4 mm thickness)**
- **Unframed**
- **1,43 m<sup>2</sup> (1.3 x 1.1 m)**
- **7,34% -9,09%**
- **Max. : 1.000 Vdc !!!**
- **:**
- **5**
- **:**
- **10 90%**
- **20 80% Pmpp**
- **: IEC 61646 & 61730**



# /

## Bulk semiconductor

# :

## thin film

/	$\mu$
▪	:
▪	wafer
▪	, . . .
	wafer, $\mu$ $\mu$
▪	$\mu$ :
▪	$\mu$
	$\mu$
▪	$\mu$ (vs. TF) $\text{CO}_2$
	$\mu$

/	$\mu$	$\mu$
▪	:	
▪		$\mu$
		$\mu$
▪		$\mu$
		$\mu$
▪	$\mu$	:
▪	$\mu$	$\text{CO}_2$
		$\mu$
▪		



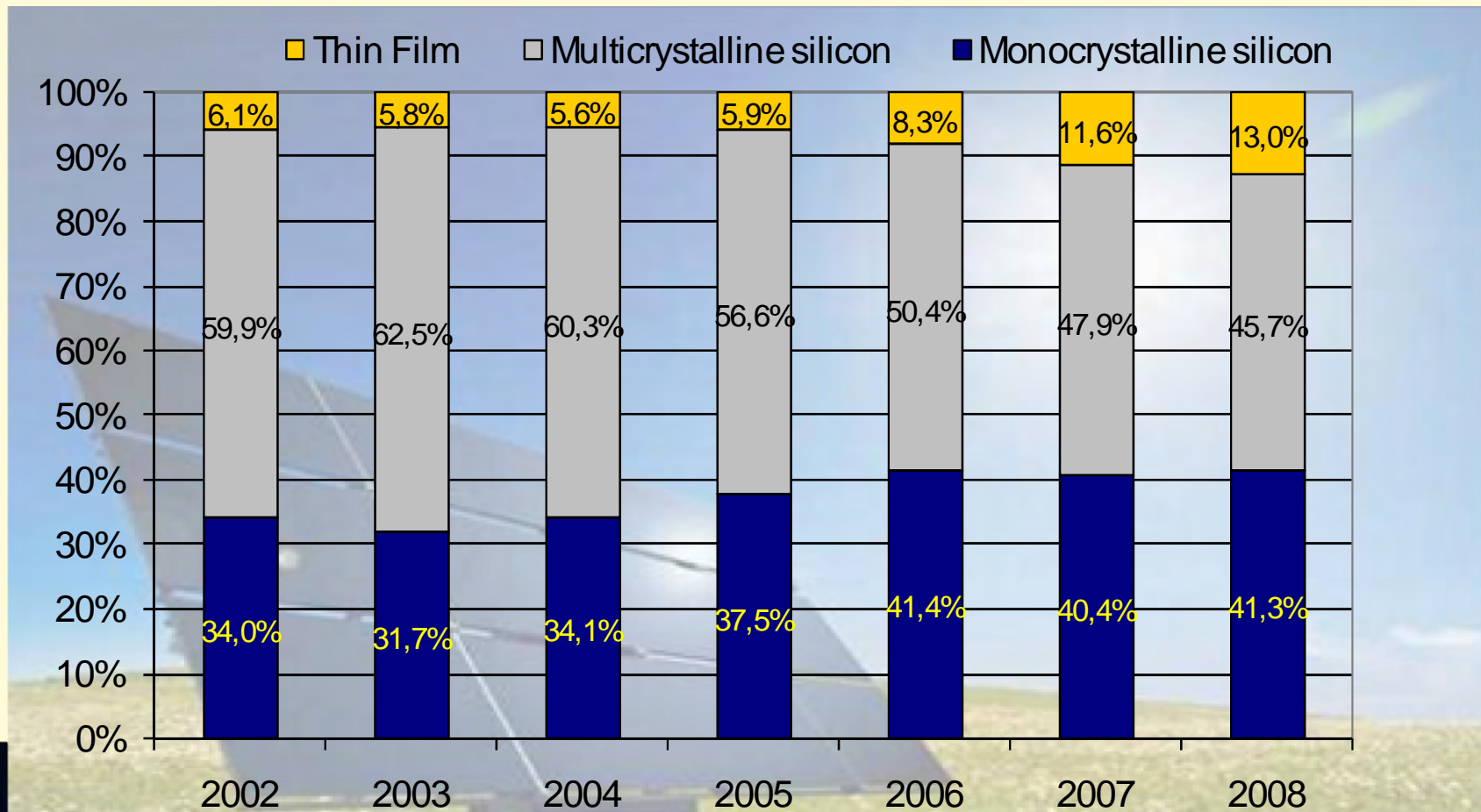


/



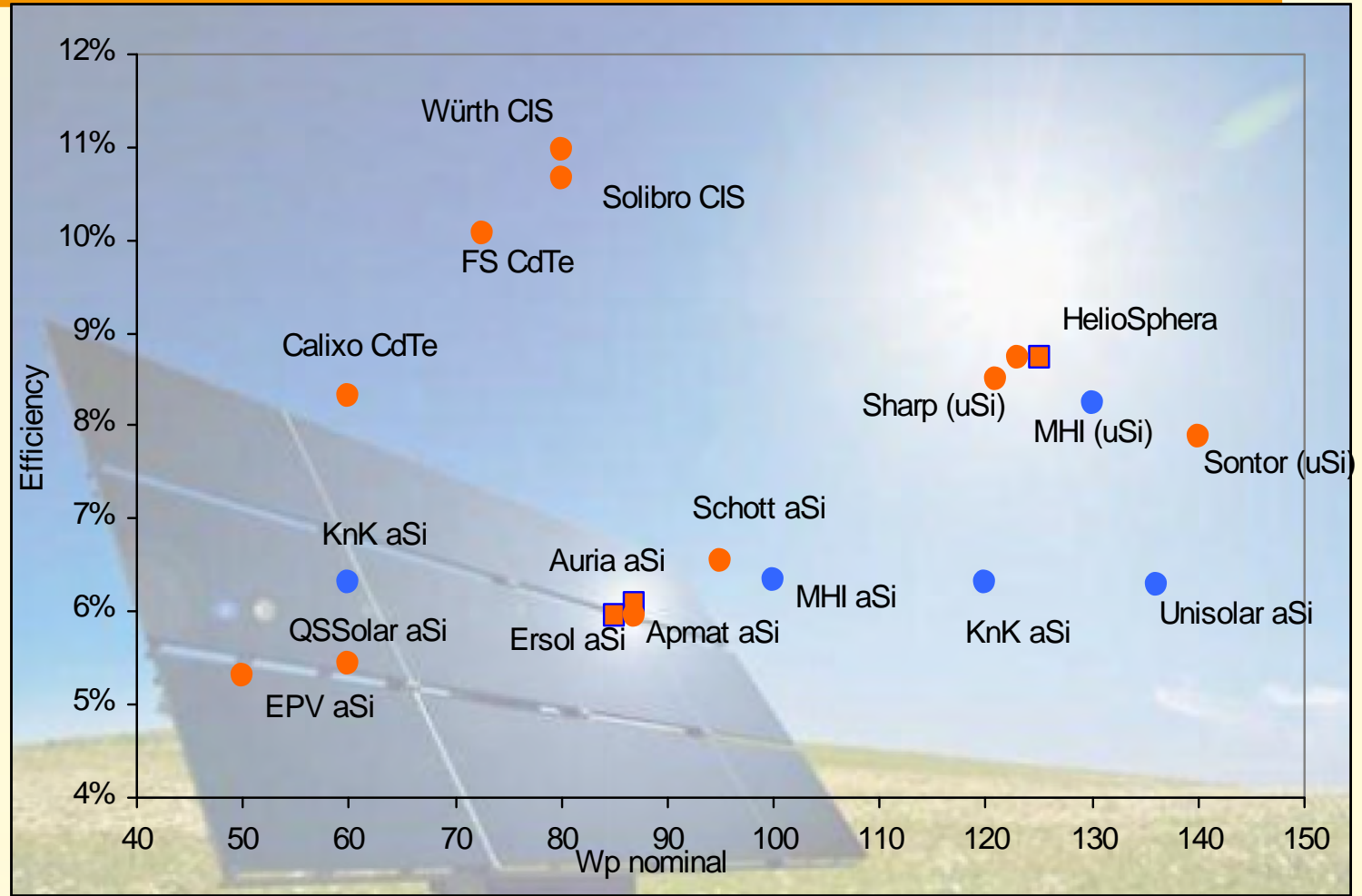
μ μ

4



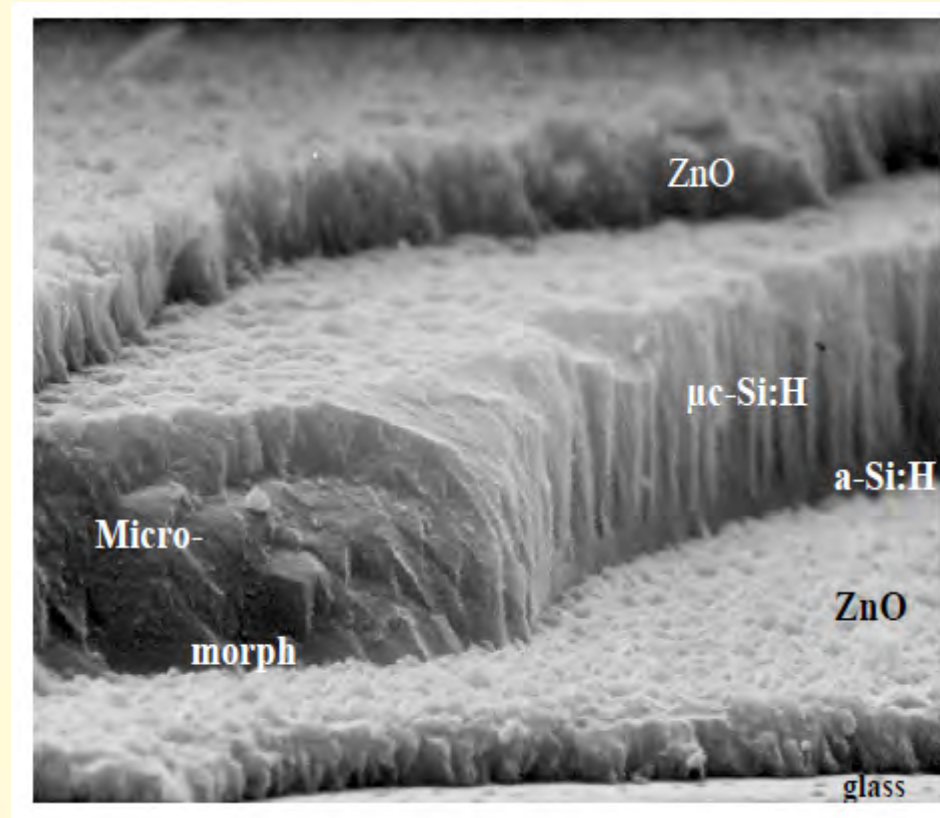
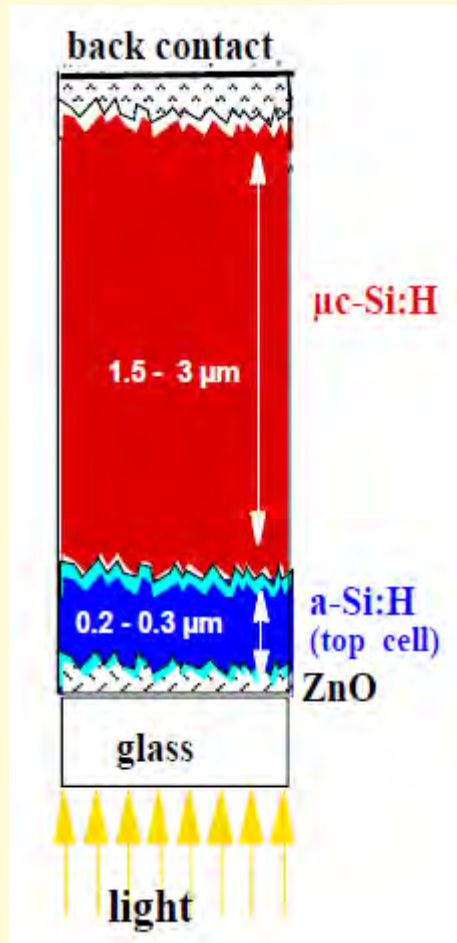


- $\mu$  :
  - 
  - 1000 Vdc
  - -0/+5 W
- Legend:**
- Max. Operating Voltage**
- 1000 Vdc
  - <600 Vdc
- Power tolerance**
- -0/+5 W
  - +/- 3%, 5% or 10%



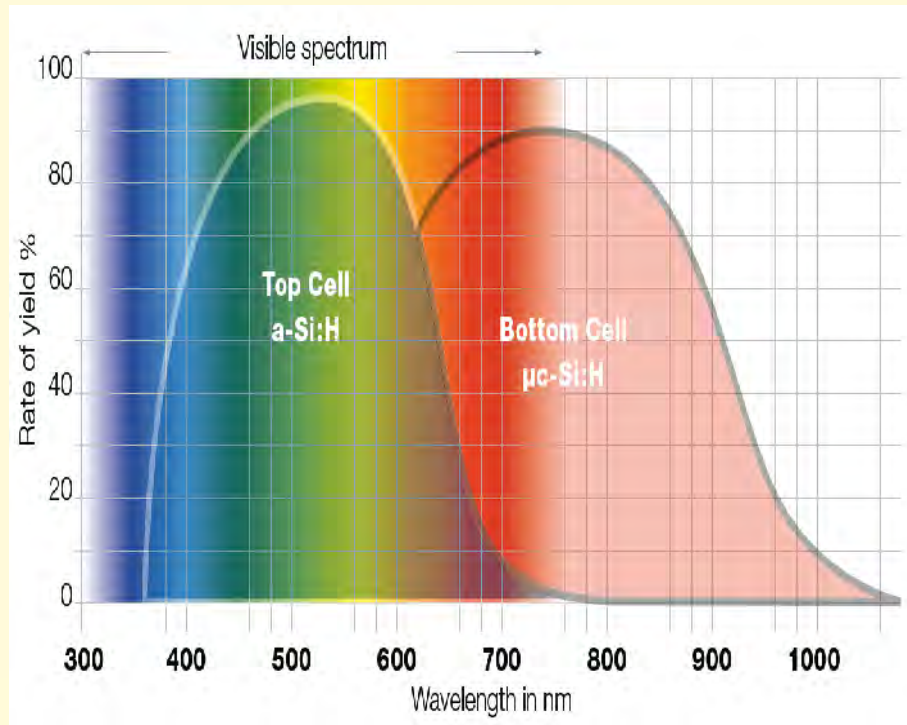
(\*) Source: public datasheets from manufacturers. Some of the products are not yet available in the market.

# $\mu$ / micromorph



$\mu$

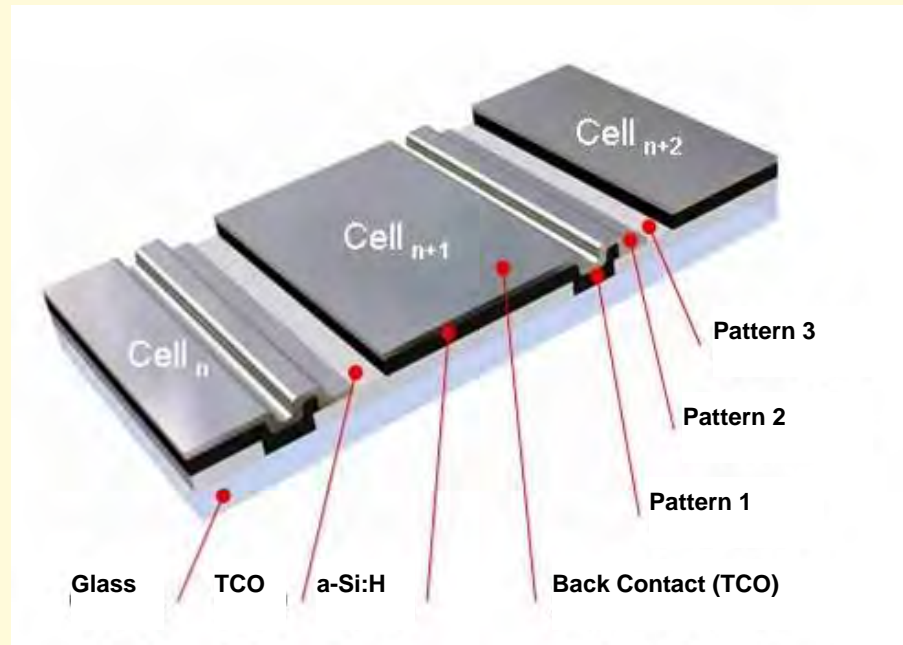
micromorph



$\mu$   
 $\mu$  / ( . . a-Si)  
 $\mu$   
 $\mu^2$   
 (a-Si & mc-Si)



# $\mu$ Micromorph /

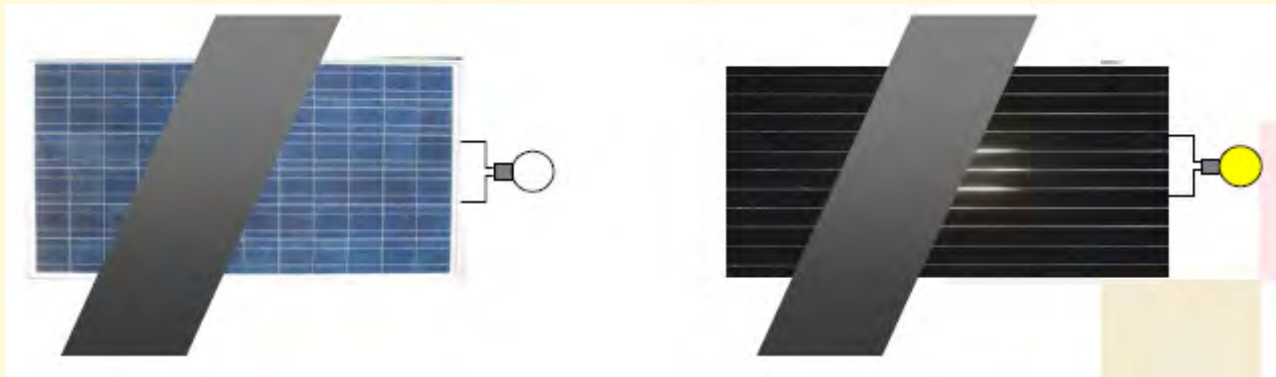


$\mu$

$\mu$

micromorph

---



Si-

Micromorph –

$\mu$   
1  
 $\mu$

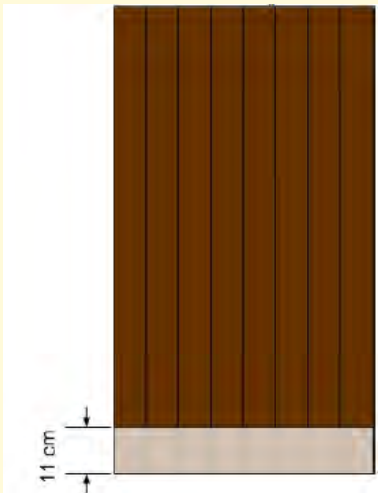
$\mu$   
 $\mu$



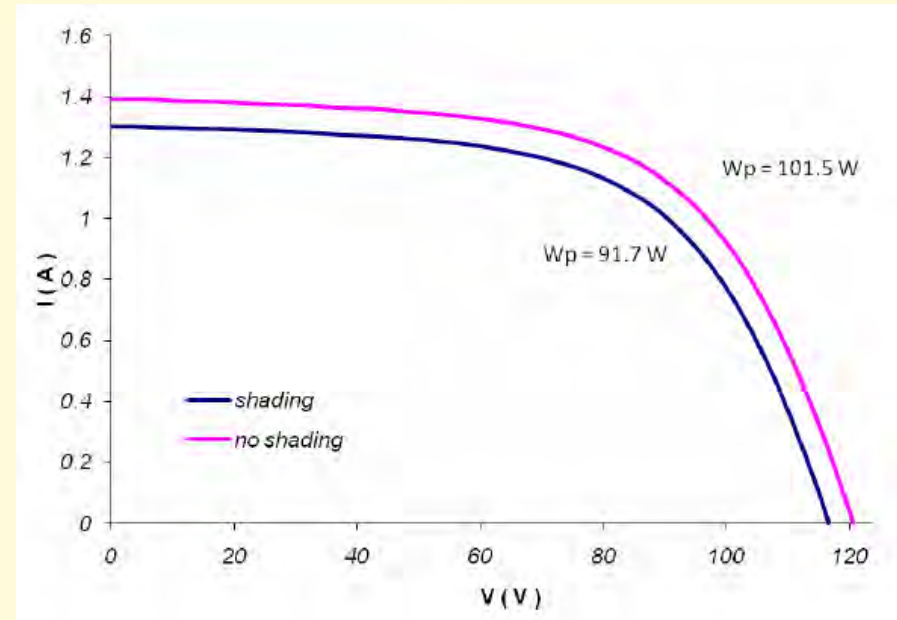
$\mu$

micromorph

$\mu$   
micromorph



$\mu$   
11cm

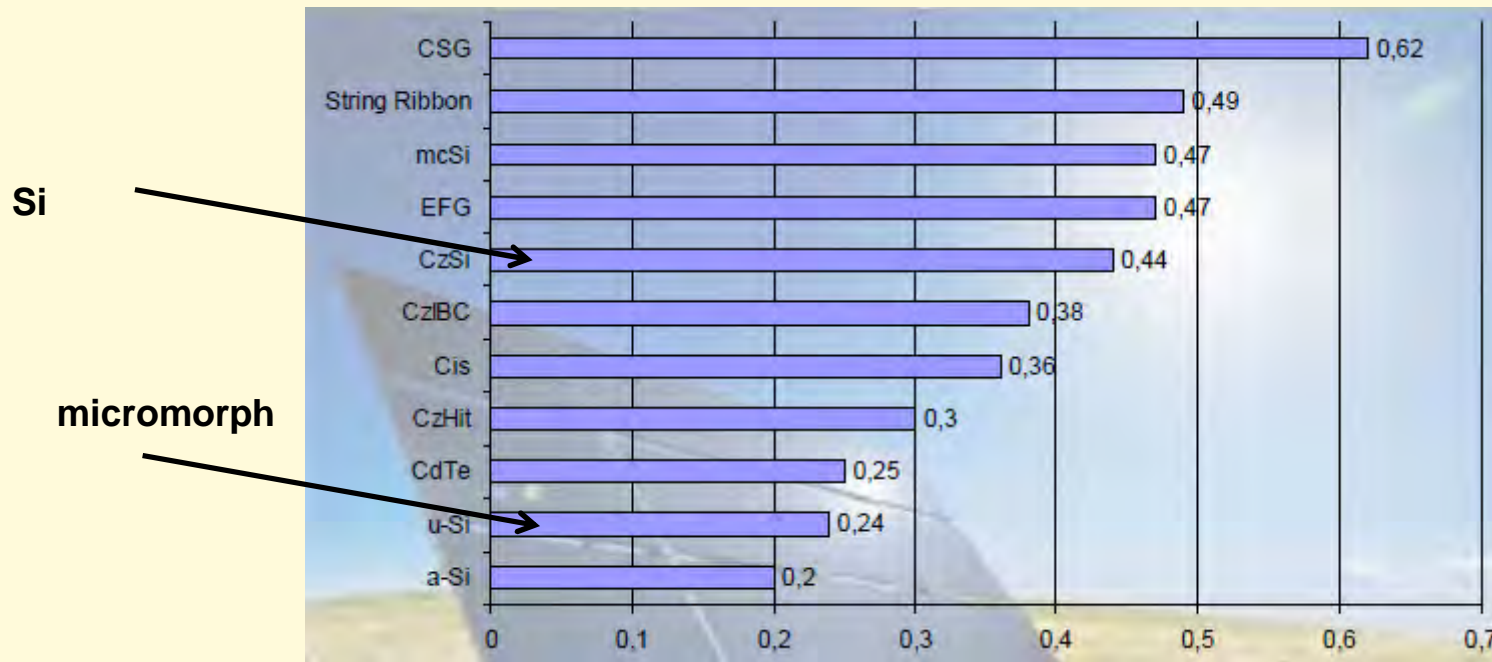


(10%)

$\mu$

micromorph

$\mu$        $\mu$



Si

micromorph

$\mu$

$\mu$

$\mu$

$\mu$

(%/°C) – 2

Si

$\mu$

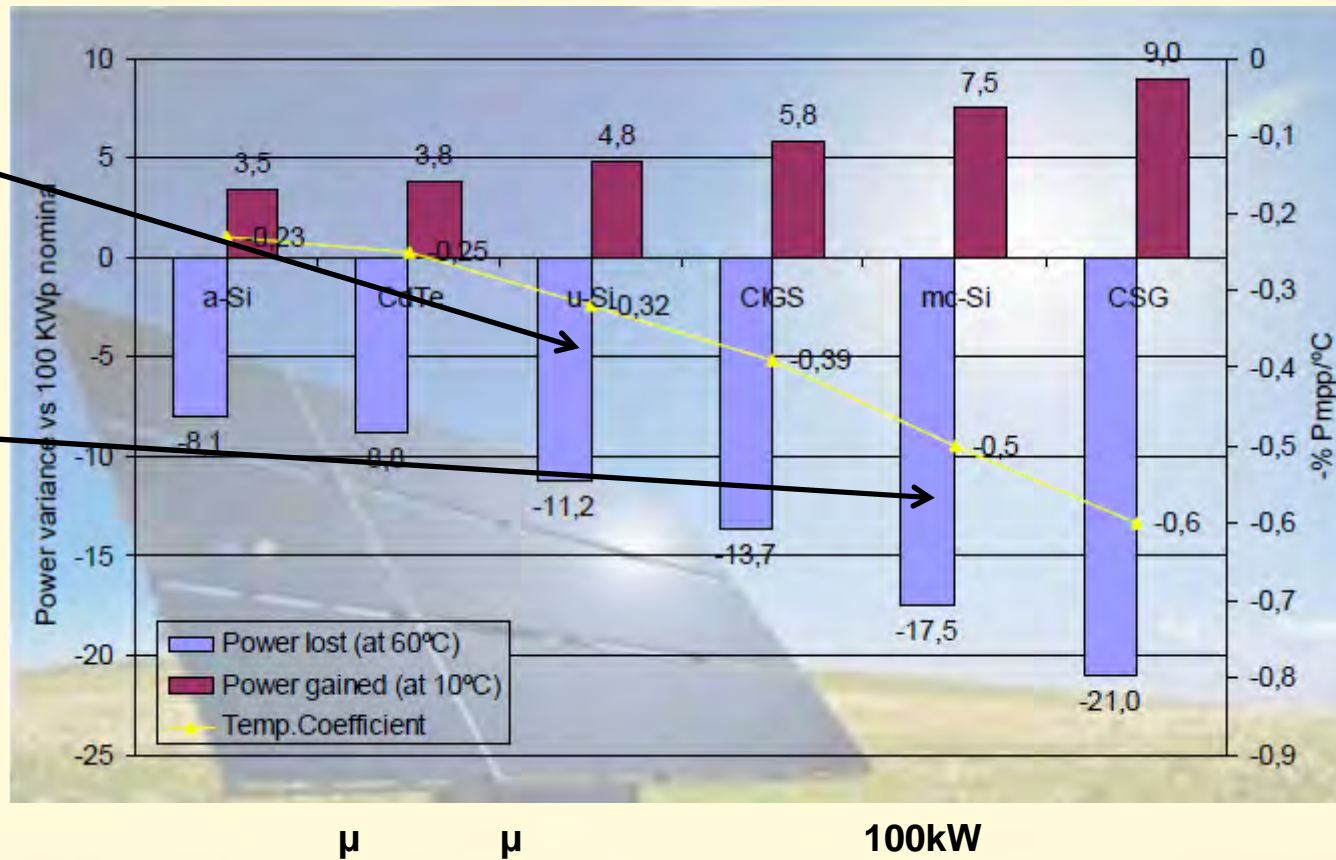
micromorph

$\mu$

/

micromorph

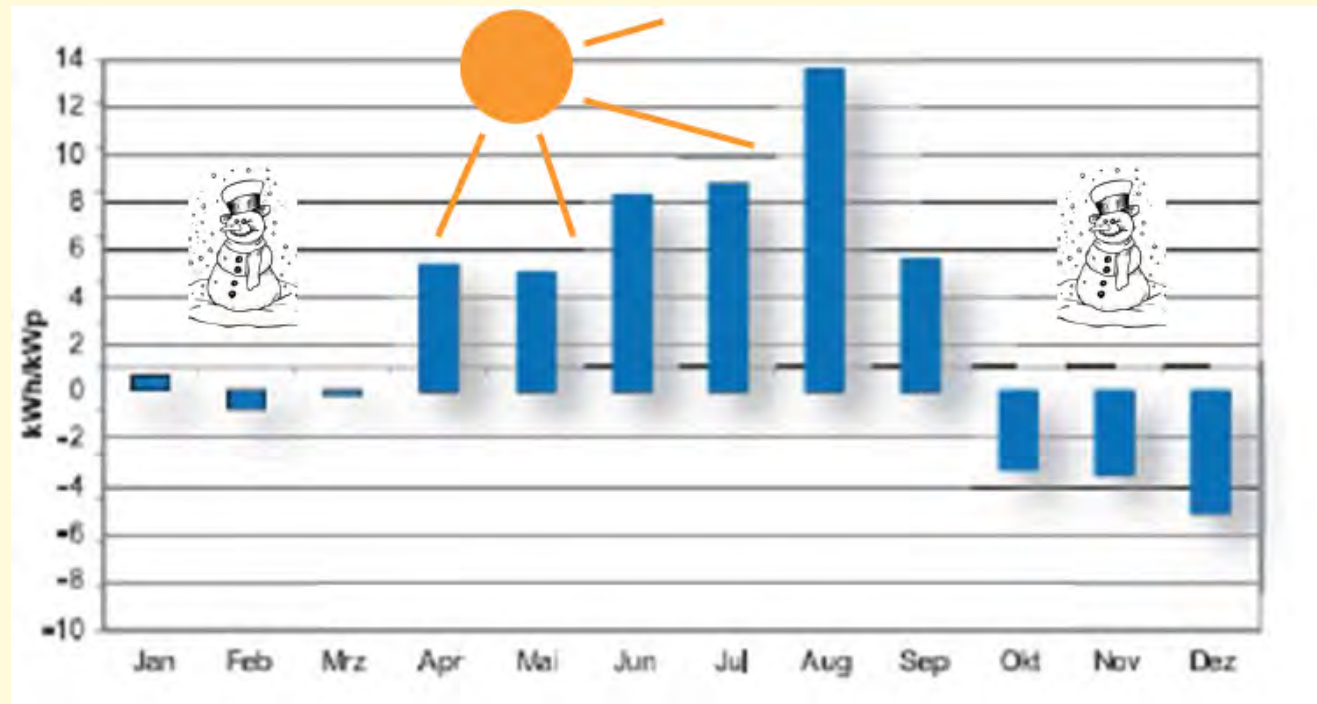
Si



μ

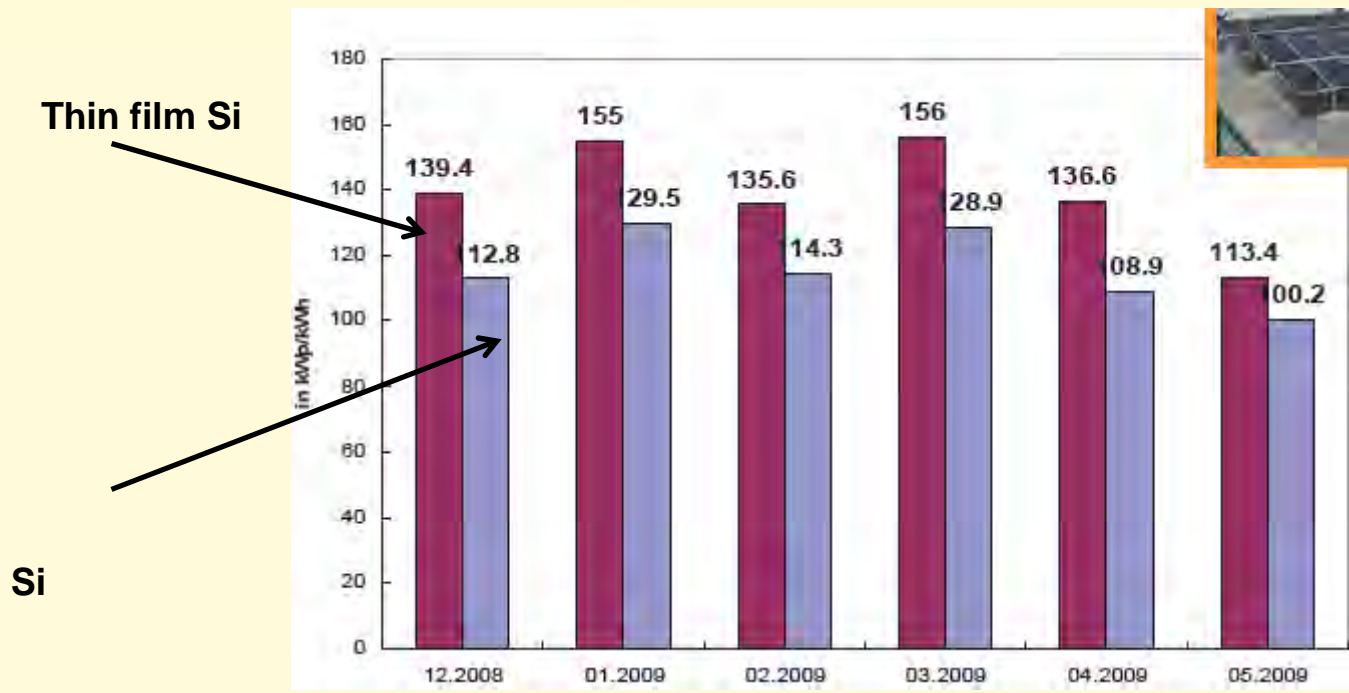
micromorph

μ



μ μ μ μ (% / °C) – Si 2

# / thin film Si



Thin film Si

Si

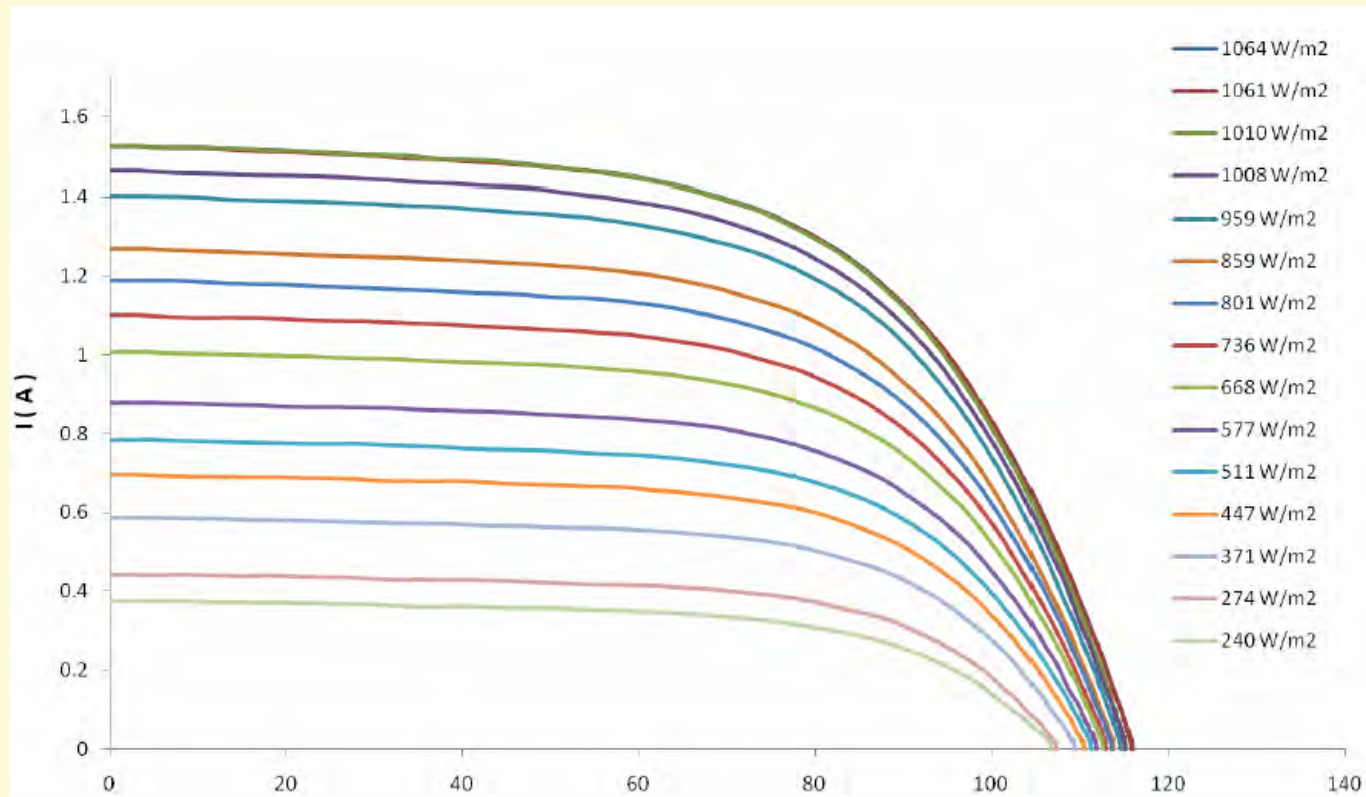
15-20%

μ kWh μ



/

μ



(200-400 W/cm<sup>2</sup> )

μ

μ

μ

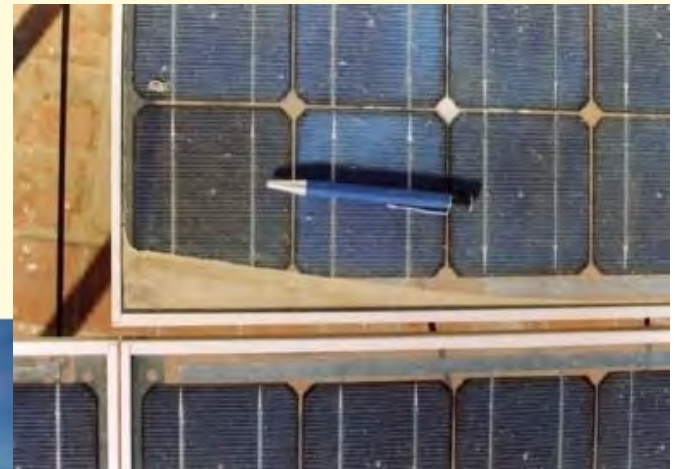


/

- μ
- 
- μ
- μ

μ

μ



# micromorph

- $(\mu\text{-Si:H } 0.8\text{g SiH}_4 / W_p \quad 10 \text{ g}/W_p \text{ for c-Si})$
- $\mu$   $\mu$   $\mu$   $(\text{a-Si:H} \sim 180\text{-}250^\circ\text{C})$
- Si -  $\mu$   $\mu$   $\mu$
- $\mu$   $\mu$  Si
- $\mu$   $\mu$   $\mu$  laser thin film (CdTe)
- Si ( . . )  $\mu$   $\mu$
- $\mu$  (energy payback time), 3-4
- $\mu$   $\mu$  **Si,** **thin film micromorph**
- $\mu$  **15%**

---

# Thank you



