

# Xite Solar



High Efficiency, Low Cost Solar

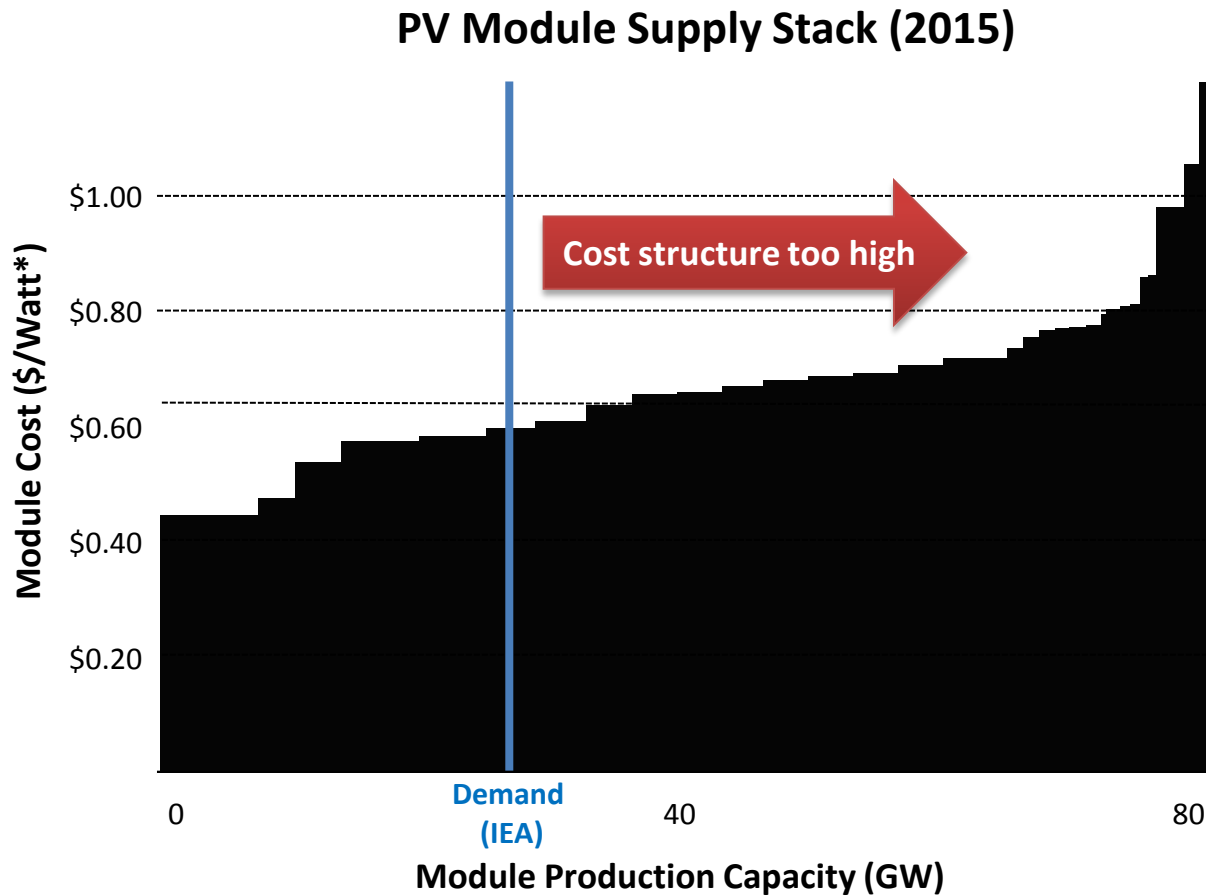
*PI: Professor Alex Zettl  
Physics Department  
UC Berkeley*

**Xite Solar**

**C2M Presentation | November 30, 2012**

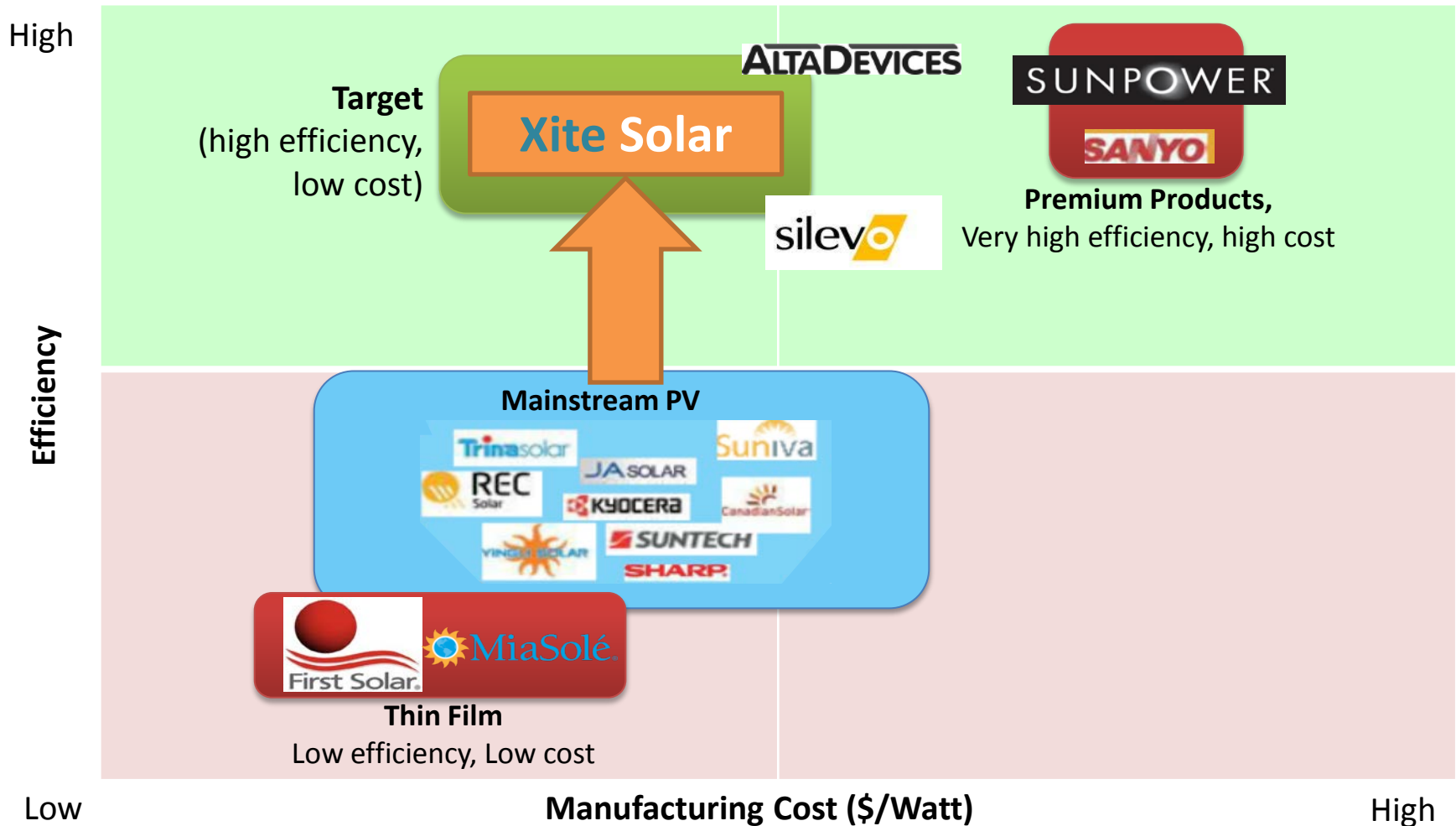
Will Greene, Javier Iriarte, Alex Luce, Rohan Ma, Emily Sangi

# PV Manufacturers **must** innovate to survive



**Billion dollar question: how do I stay competitive?**

# The Goal: High Efficiency, Low Cost PV

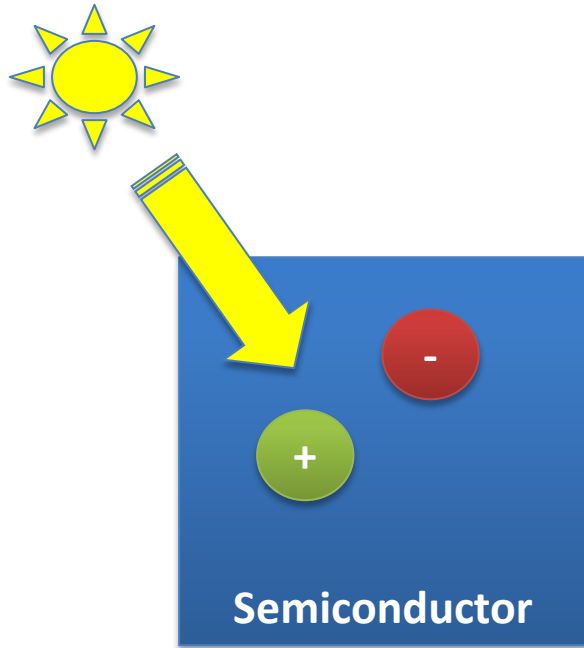


*Note:* Position of companies in the chart is not comprehensive. It is only indicated for illustrative purposes.

*Source:* Yole Development and independent research.

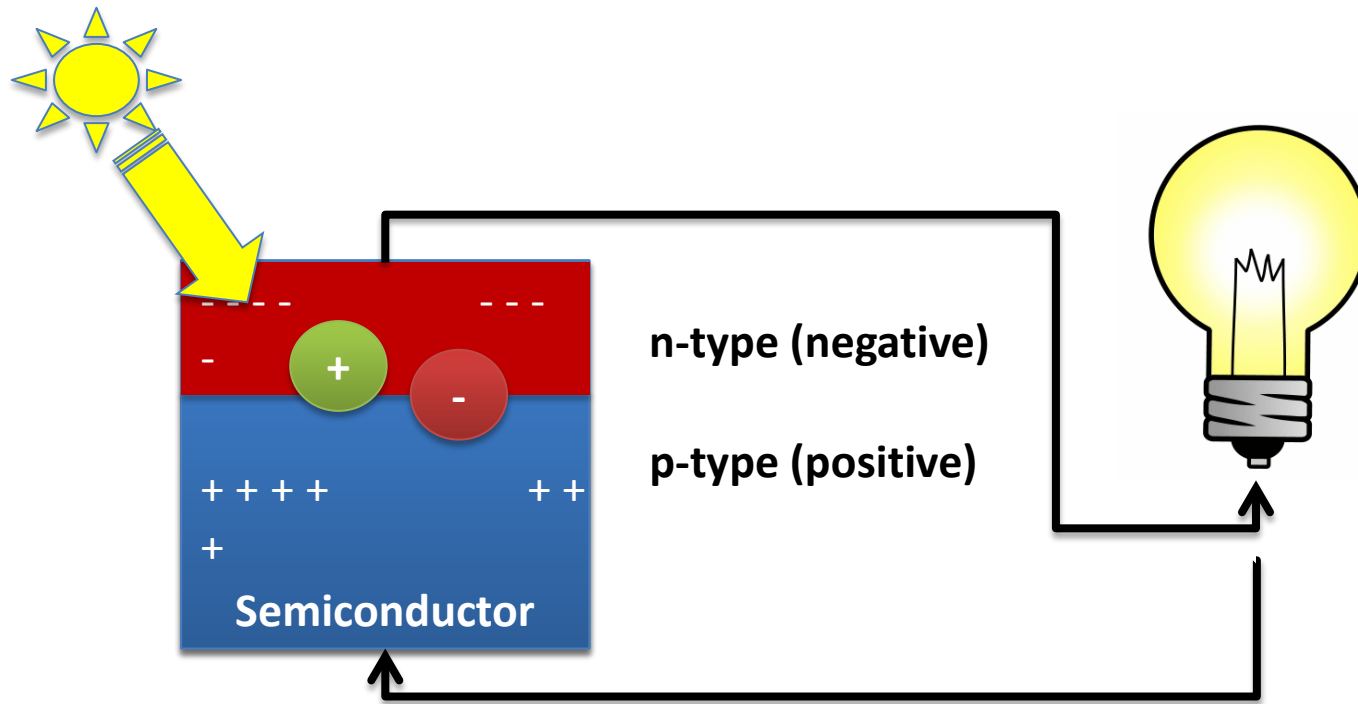
# Solar Cells: the Photovoltaic Effect

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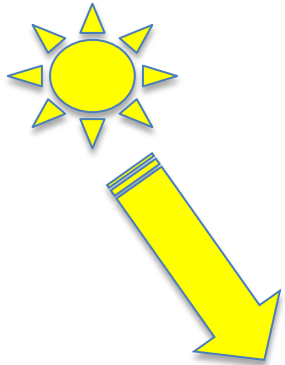
# Solar Cells: the Photovoltaic Effect

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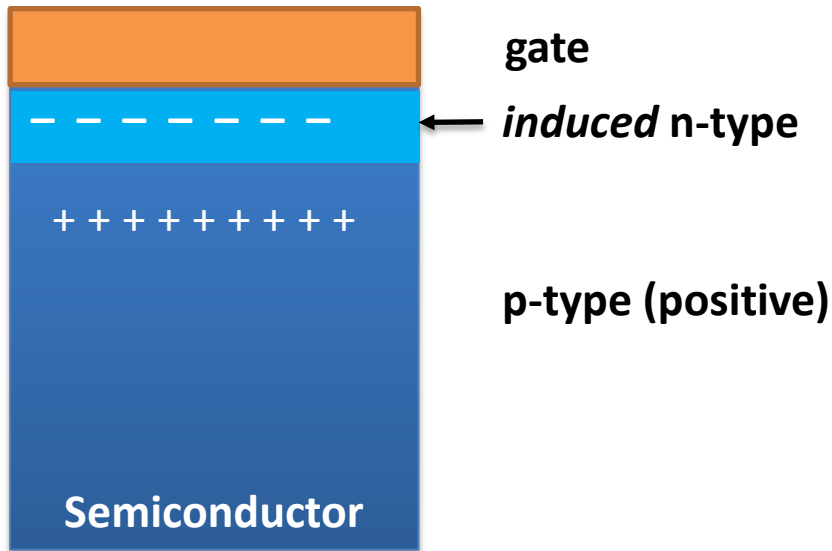


# Solar Cells: the Photovoltaic Effect

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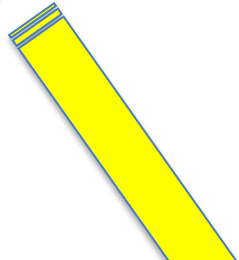


**Problem: *gate screening!***

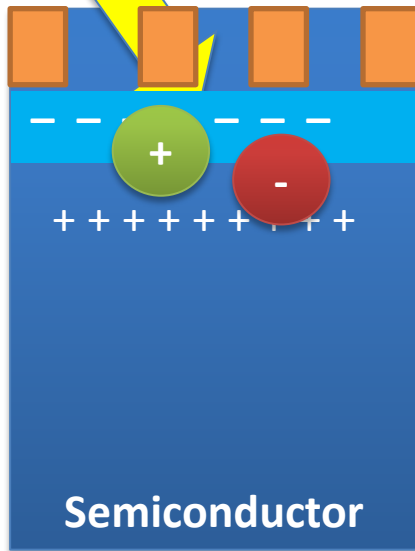


# Solar Cells: the Photovoltaic Effect

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**Solution: *transparent gate!***

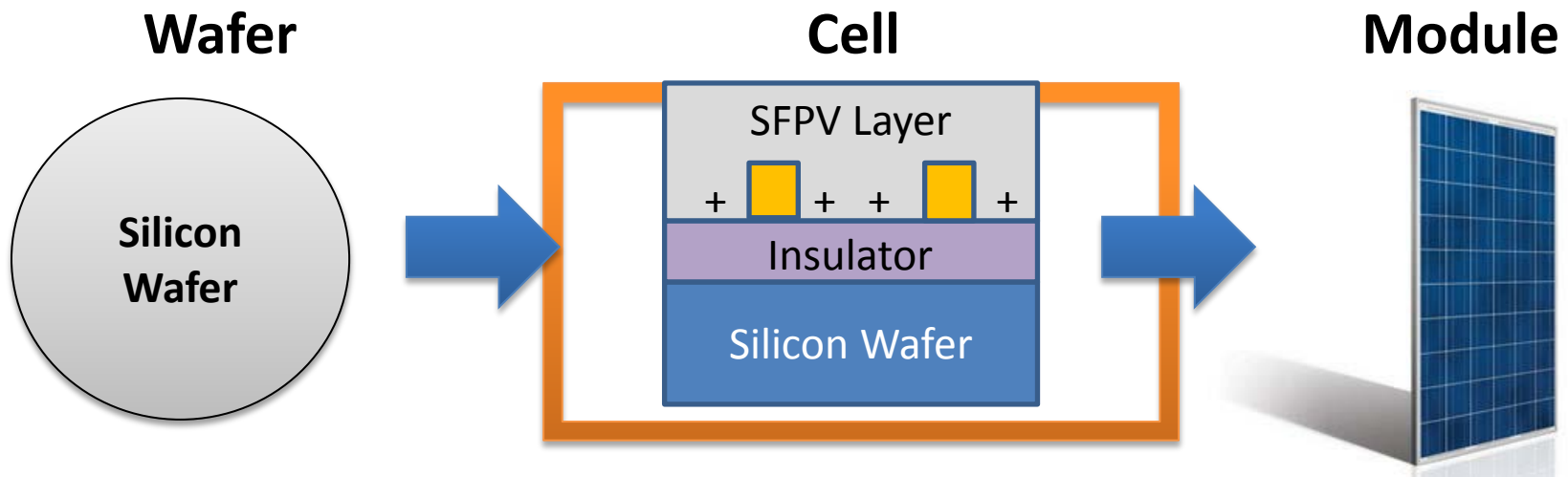


***Narrow gate***  
***induced n-type***

**p-type (positive)**



# Xite can make an improved MIS Solar Cell



Si MIS cells can attain >21% lab efficiency, but degrade

✗ Tunnel insulator ( $\text{SiO}_2$ ) thickness instability

✗ Surface treatment degrades over time

*Xite can prevent degradation and boost efficiency*

✓ **Gating** functions as surface treatment & **potential barrier**

✓ **Potential barrier** protects against insulator thinning



# How can Xite monetize the technology?

## PRODUCT

### Solar Modules



### Fabrication Equipment



## REVENUE MODEL

**Independent Manufacturer**  
(Sales Revenue)



**Joint Venture**  
(Revenue Share)



**License IP**  
(Royalties)



# Xite's Market Opportunity

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Silicon PV module sales (~\$14 bn/yr)

New investments in  
manufacturing plants &  
equipment (~\$3 bn/yr)

**Xite's development cycle targets 2017 commercial availability, coinciding with an expected turnover phase in manufacturing lines.**

## *Key Assumptions*

- Silicon PV ~90% market share in 2017
- CapEx~20% of 2017 sales, R&D ~1% of 2017 (based upon '06-'12 SEC data of largest PV manufacturers)

# The solar landscape is rapidly changing

Price Craters

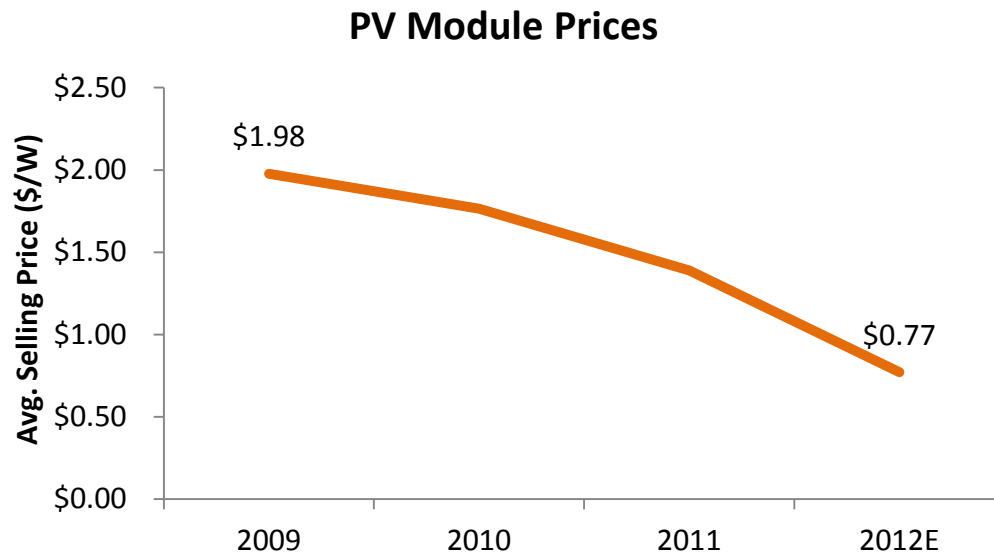
China Wins

Silicon  
Dominates

Industry  
Consolidates

## PV \$/W prices have plummeted

*Solar module prices have dropped **61%** in the past three years*



### Xite Advantage

- ✓ SFPV can drive much-needed efficiency gains for manufacturers
- ✓ Boosting efficiency has a multiplier effect on cost reduction as it scales across the entire system

# The solar landscape is rapidly changing

Price Craters

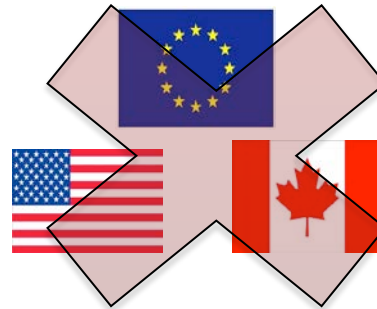
**China Wins**

Silicon  
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## China wrings out all of the cost

*Share of solar production in US, Canada, & Europe  
will fall from 32% (2009) to **9% in 2015***



### Key Advantage

- ✓ SFPV promises performance gains to “R&D-lite” Chinese manufacturers
- (Public Chinese firms spend an average 1/3 of what non-Chinese firms spend on R&D)

# The solar landscape is rapidly changing

Price Craters

China Wins

**Silicon  
Dominates**

Industry  
Consolidates

**Silicon will dominate because industry is already at scale**

*Share will rise from 81% (2009) to >95% in 2015*

Si

CdTe

CIGS

GaAs

## Xite Advantage

- ✓ Leverages existing Si infrastructure
- ✓ Allows Si suppliers to leapfrog efficiency roadmaps
- ✓ Simpler & more cost-effective than SunPower method

# The solar landscape is rapidly changing

Price Craters

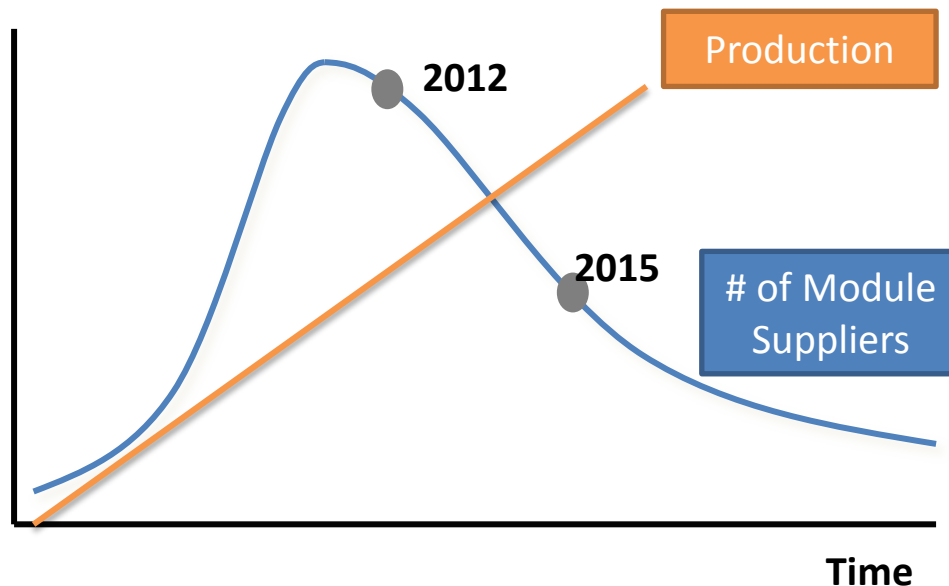
China Wins

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## The solar industry will undergo a massive consolidation

*60% of suppliers will exit by 2015*

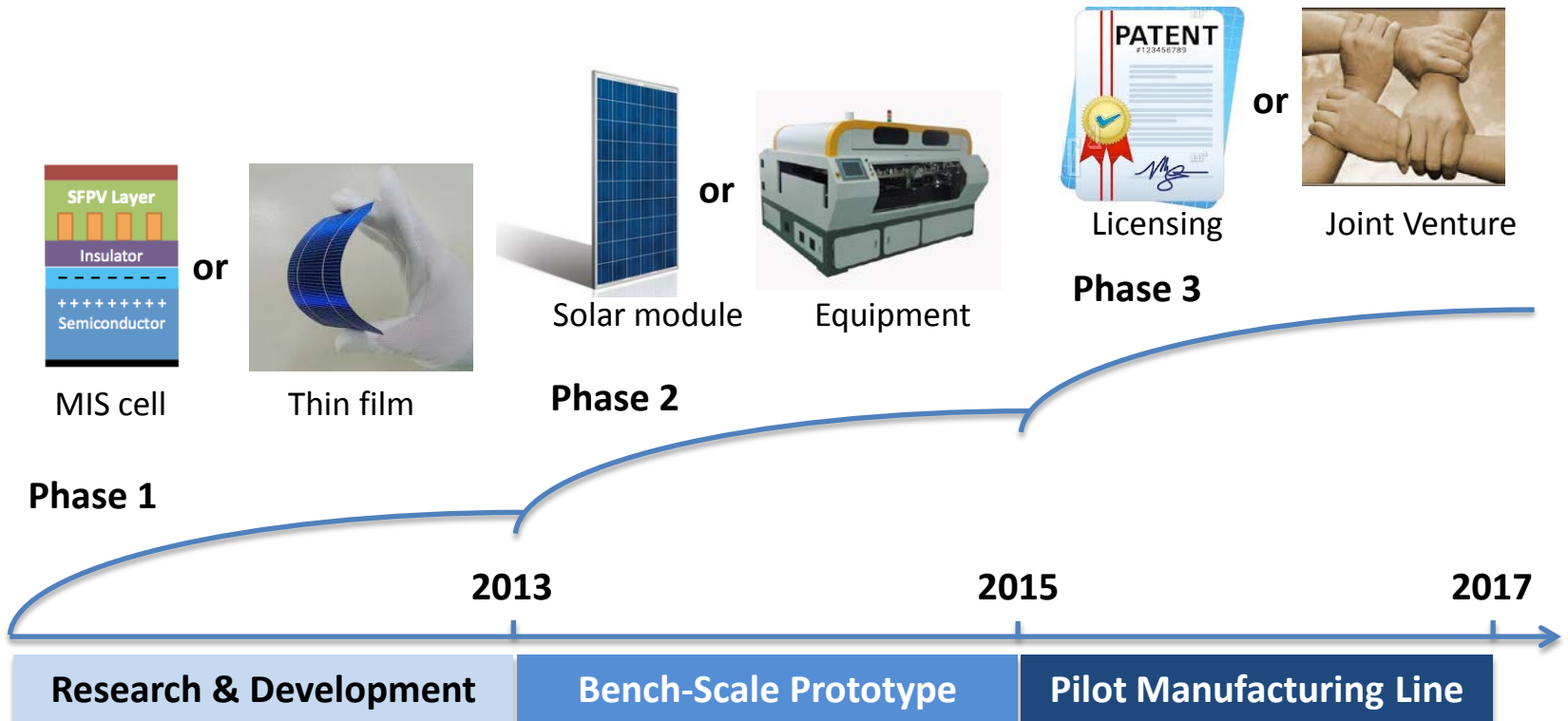


### Xite Advantage

- ✓ SFPV complements rather than competes with the suppliers that will survive
- ✓ Firms can't just compete on costs, they have to innovate to survive

# Which is the right path for Xite?

R&D results and partnerships will be key determinants



# What are we doing today?

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- Funding:** Raise several \$100k to continue R&D
- R&D:** Design a novel MIS cell architecture  
Gather SFPV efficiency improvement data
- Commercial:** Begin commercial relationships with manufacturers to validate technology and gain technical/manufacturing support

## PV Manufacturers



## Other Potential Manufacturers

