

— NEXT —

WINDOW OF OPPORTUNITY

*Transparent Power*

Next Energy Technologies Inc. - Confidential

# A PRODUCT OF THE TMP PROGRAM



- NEXT won TMP NVC in 2010
- NEXT was spun out of UCSB/TMP in 2011
- CEO introduced to NEXT by TMP (Bob York)
- First and Major Investors introduced to NEXT by TMP (Bob York)
- Co-Founder and CTO Corey Hoven earned GPMP certificate from TMP
  - Business plan originally developed in a TMP class
  - Financial models originally developed in a TMP class



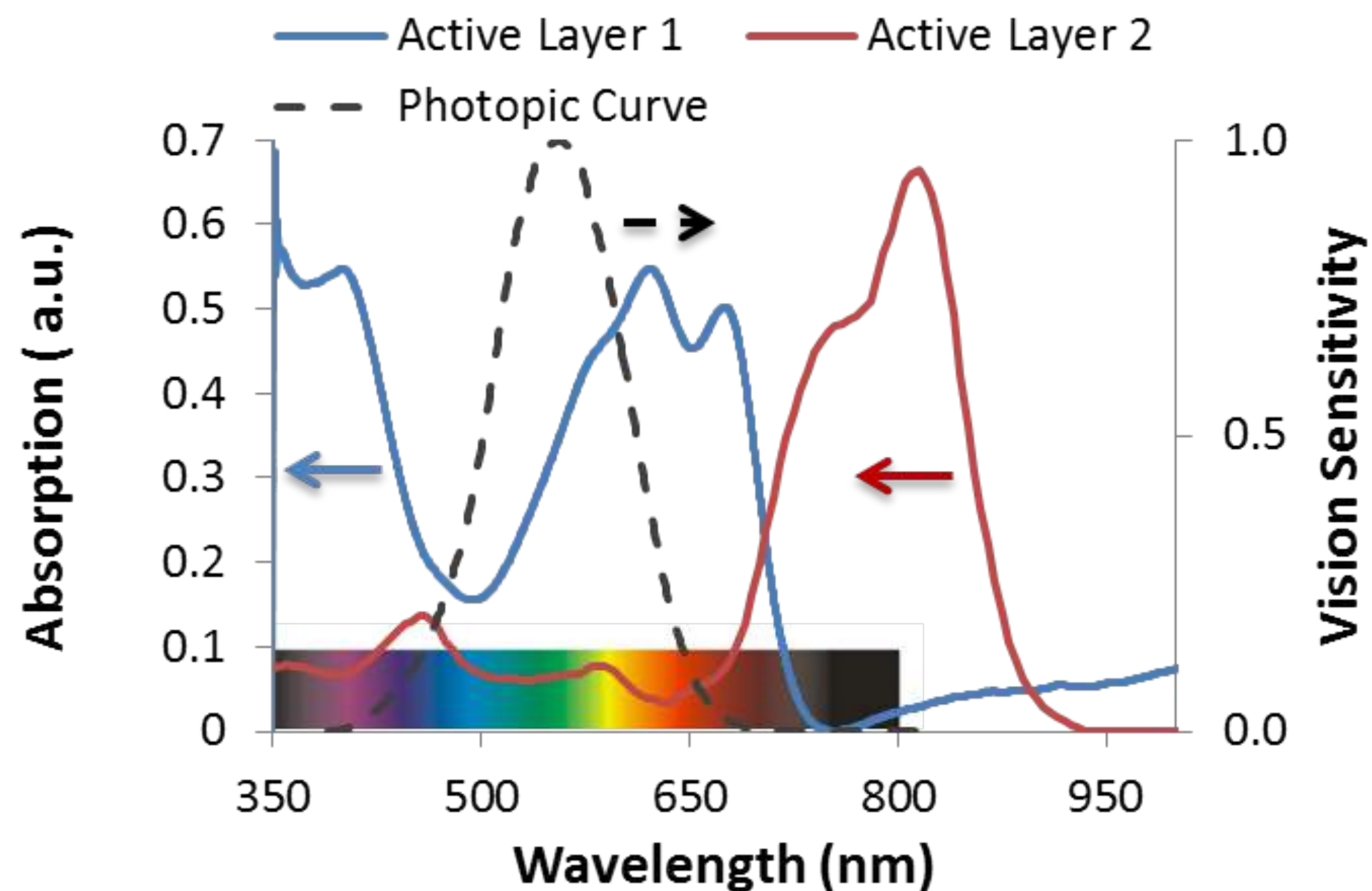
# THE PROBLEM - BUILDING ENERGY USE

- Buildings consume ~50% of global energy & produce ~50% of global greenhouse gas emissions
- Energy is single largest variable operating expense for buildings ~ 25% of Total
- Regulatory Regimes are Driving Toward NET ZERO Energy
- Few Options for Onsite Renewable Energy Generation



# WINDOWS REQUIRE TRANSPARENCY

*Unlike conventional solar, NEX T SSM-OPV is color tunable and can absorb light in a chosen spectrum only - resulting in good transparency in the visible spectrum.*



*NEX T's coatings (active layers) have low absorption in blue resulting in good transparency for the human eye (photopic vision)*



*NEX T's transparent solar module also delivers performance and functionality of a Low-E window*



# NEXT SSM-OPV - DRAMATICALLY LOWER COSTS



## Materials

- Low Cost
- Abundant
- Non-Toxic
- Recyclable



## Processing

- Low Cost
- Low Energy
- High Speed
- Flatbed Printing



## Capital

- Low Cost
- High Scalability



## Balance of System

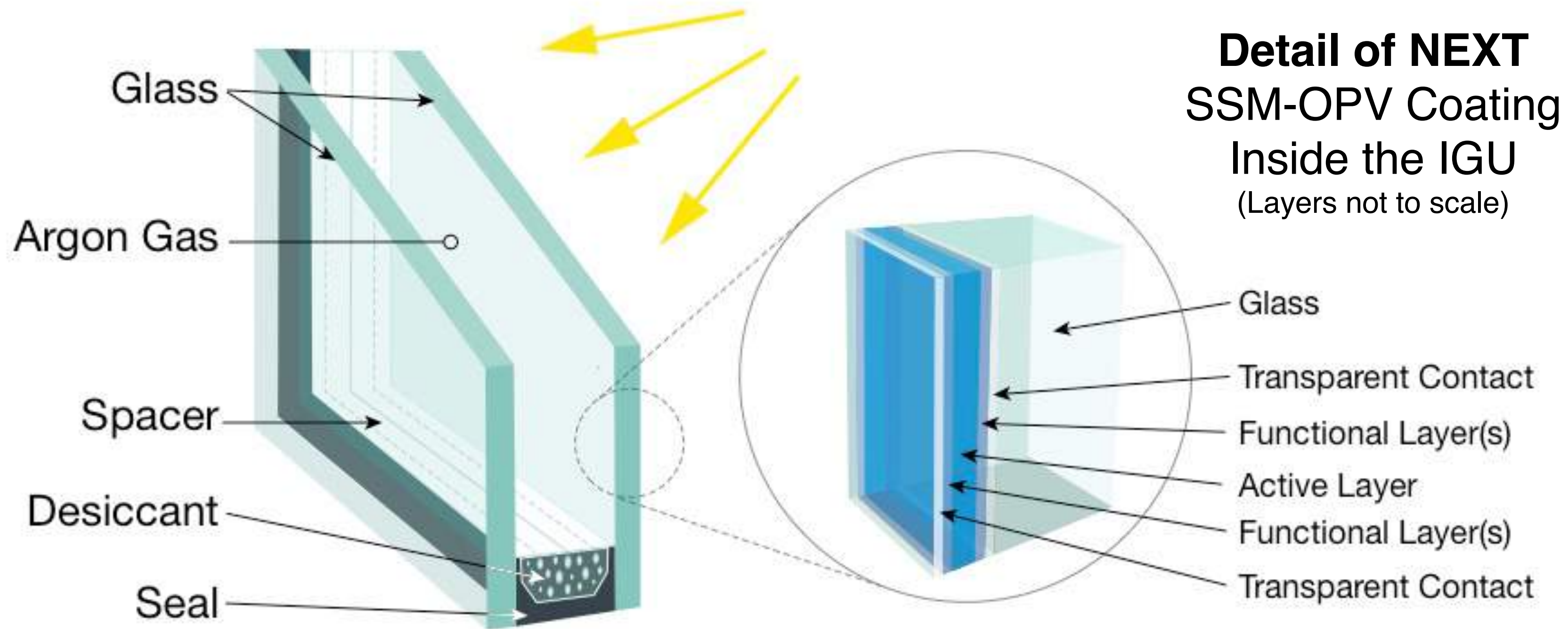
- Integrated
- Low Cost



# COMPELLING ECONOMICS

Encapsulation costs are effectively eliminated by the window.  
Incremental cost is limited to NEXT's SSM-OPV technology...

**Window/IGU**  
(Insulated  
Glass  
Unit)



...AND, U.S. Federal Tax credit applies to the entire cost of the installed window.



# NEXT LEADERSHIP



**Daniel Emmett, CEO & Co-Founder**  
*Innovo Energy Solutions, Douglas  
Emmett, Inc. (REIT). M.A. Stanford Univ.*



**Dr. Corey Hoven, CTO & Co-Founder**  
*Ph.D. Materials Science and Post-Doc,  
University of California Santa Barbara*



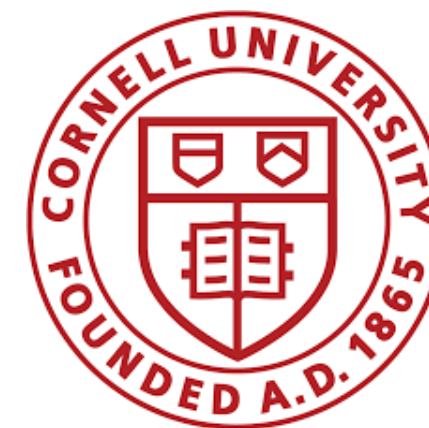
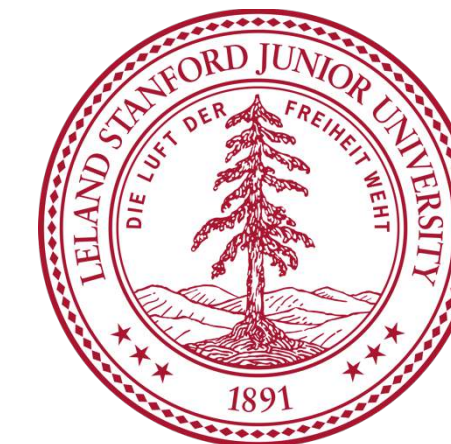
**Dr. Arnold Tamayo, Director of  
Molecular Design & Co-Founder**  
*Asst. Professor CO School of Mines  
Ph.D. Chemistry, USC, Post-Doc. UCSB*



**Mike Griffiths, CFO**  
*V2 Records, Sony Music Europe,  
Conran Holdings Ltd.*



**Dr. Matthew Lloyd, Dir. of Reliability**  
*National Renewable Energy Laboratory,  
Ph.D. Materials Science & Engineering,  
Cornell University*





# NEXT DIRECTORS AND ADVISORS

Directors & Advisors Are Leaders From Industry, Academia, Government & Design

Board of Directors

**James G.P. Dehlsen** Zond Wind (acq. GE Wind) and Clipper Windpower



**Andy Cohen, FAIA**, Co-CEO, Gensler



**David Smukowski**, Sensors in Motion, former Boeing Ventures



Board of Advisors

**Professor John E. Anthony, Ph.D.**, University of Kentucky, Chemistry

**Professor Michael Chabynec, Ph.D.**, UC Santa Barbara, Materials Science



**Dan A. Emmett**, Chairman, Douglas Emmett, Inc. (REIT)



**Reyad Fezzani**, former CEO, BP Wind & Solar

**Jeff Horowitz**, LEED AP, Horowitz Group

**Professor Michael McGehee, Ph.D.**, Stanford University

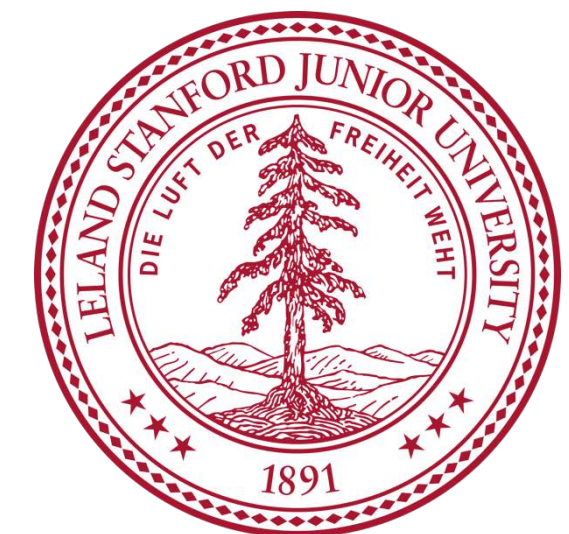


**Udi Paret**, former Pythagoras Solar

**Terry Tamminen**, former CalEPA Secretary



**M. Amelia Taylor**





# STRATEGIC RELATIONSHIPS & GRANTS

Strategic Relationships with Corporate Advisors & Partners Help Accelerate Speed To Market & Reduce Risk

Architecture & Design

Coating Equipment

Glass Manufacturing & Fabrication

Chemical Manufacturing & Materials

Grants Totaling ~\$3M Are An Independent Validation of Technology & Approach





# NEXT


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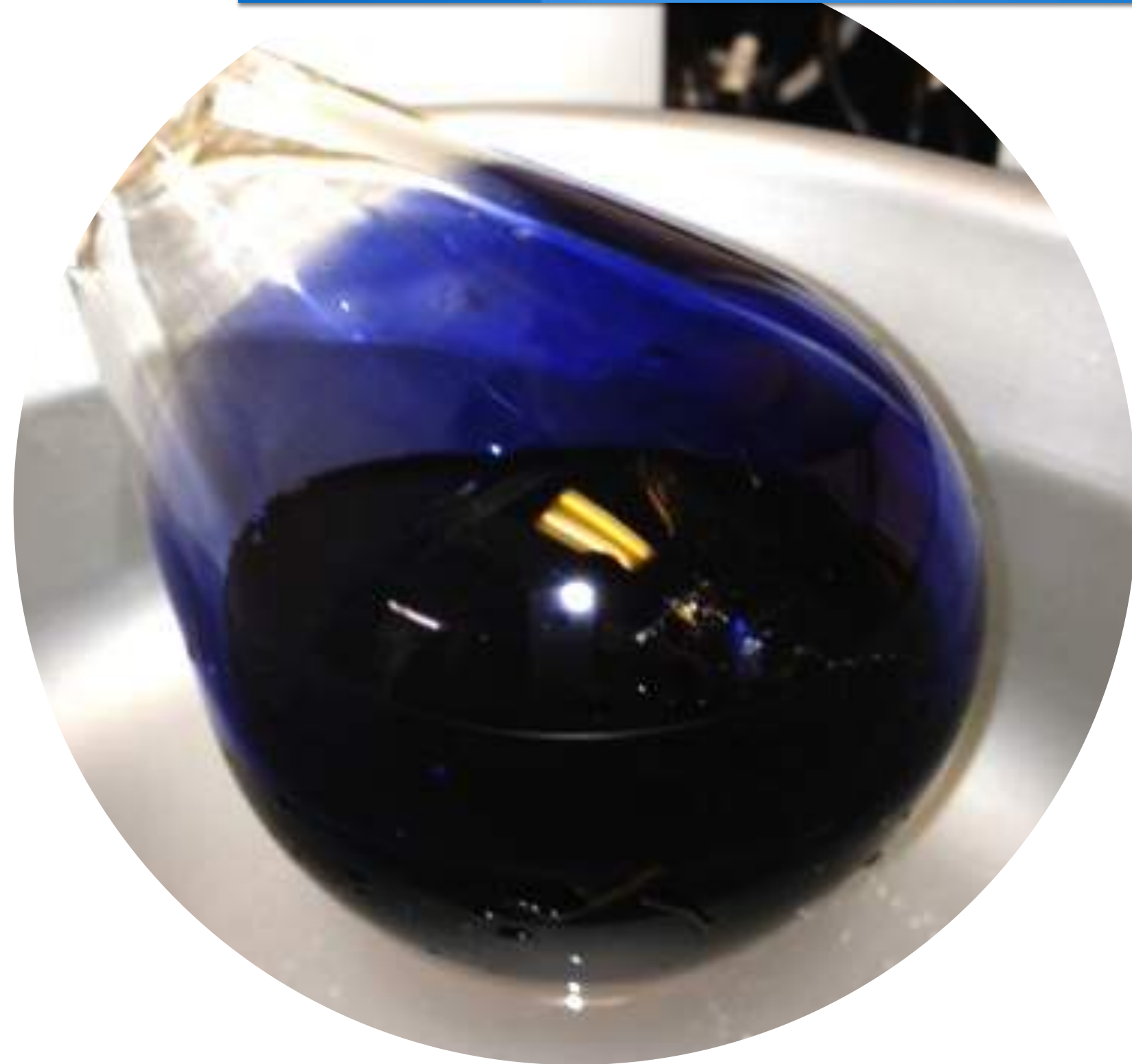
**ADDITIONAL SLIDES**



# NEXT'S TECHNOLOGY BREAKTHROUGH

## SSM-OPV

*Soluble (S) + Small Molecule (SM) + Organic (O) + Photovoltaics (PV)*



- **Soluble** – inks enable low cost processing
- **Small Molecule** – stable & scalable materials
- **Organic** – visible light transmission
- **Photovoltaic** – electricity generation

Breakthrough technology allows NEXT to succeed where other OPV efforts have not.



# NEXT'S TECHNOLOGY DIFFERENTIATION

*Proprietary SSM-OPV technology removes critical development and manufacturing barriers faced by previous polymer-based organic photovoltaic technology.*

## Polymer-OPV

- ✓ \$: Solution Processable
- ✗ Inconsistent materials
- ✗ Unreliable performance
- ✗ Impurities affect quality
- ✗ Difficult to scale

## Vapor Deposited Small Molecule -OPV

- ✗ \$\$\$\$ Vapor Deposition
- ✓ Uniform materials
- ✓ Reliable performance
- ✓ Pure
- ✗ Difficult to scale

## NEXT's SSM-OPV

- ✓ \$: Solution Processable
- ✓ Uniform materials
- ✓ Reliable performance
- ✓ Pure
- ✓ Scalable



# NEXT SSM-OPV - CLEAR PATH TO VIABLE LIFETIMES

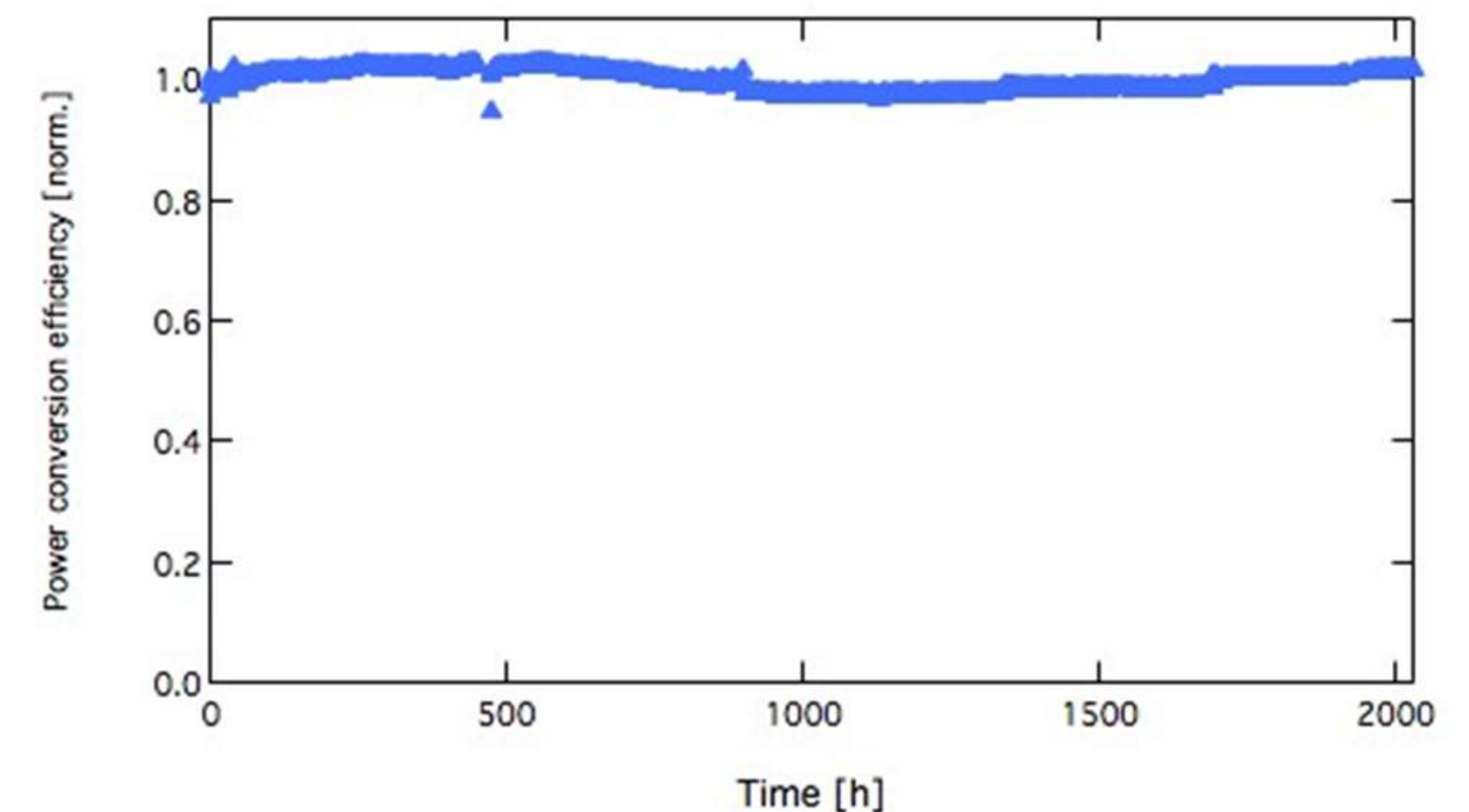
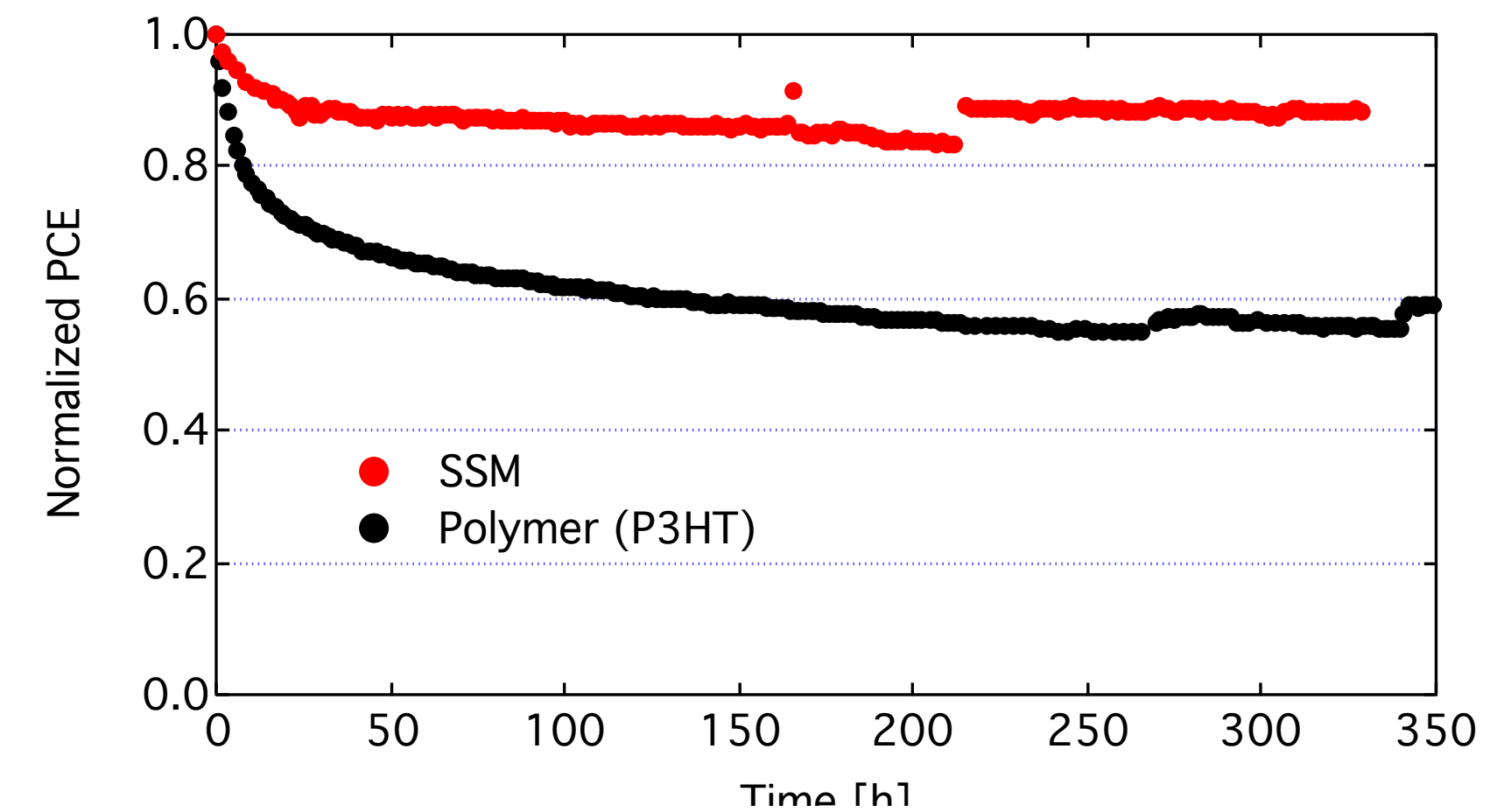
A clear path to viable product lifetimes of 25 - 30 years

## NEXT SSM-OPV vs. P3HT

- Under identical testing conditions, NEXT's samples show remarkable improvement in stability relative to P3HT
  - NEXT SSM device: **RED**
  - P3HT device: **BLACK**
- PCE measurements take into account decay in lamp intensity during sample storage
- Work is underway to mitigate the initial burn-in

## NEXT SSM-OPV lifetime

- Intrinsic stability via molecular design
- Demonstrated morphological stability
- Accelerated lifetime testing and experiments are underway to extrapolate the time to end-of-life
  - **Up to 30 year lifetime feasibility shown by NEXT**

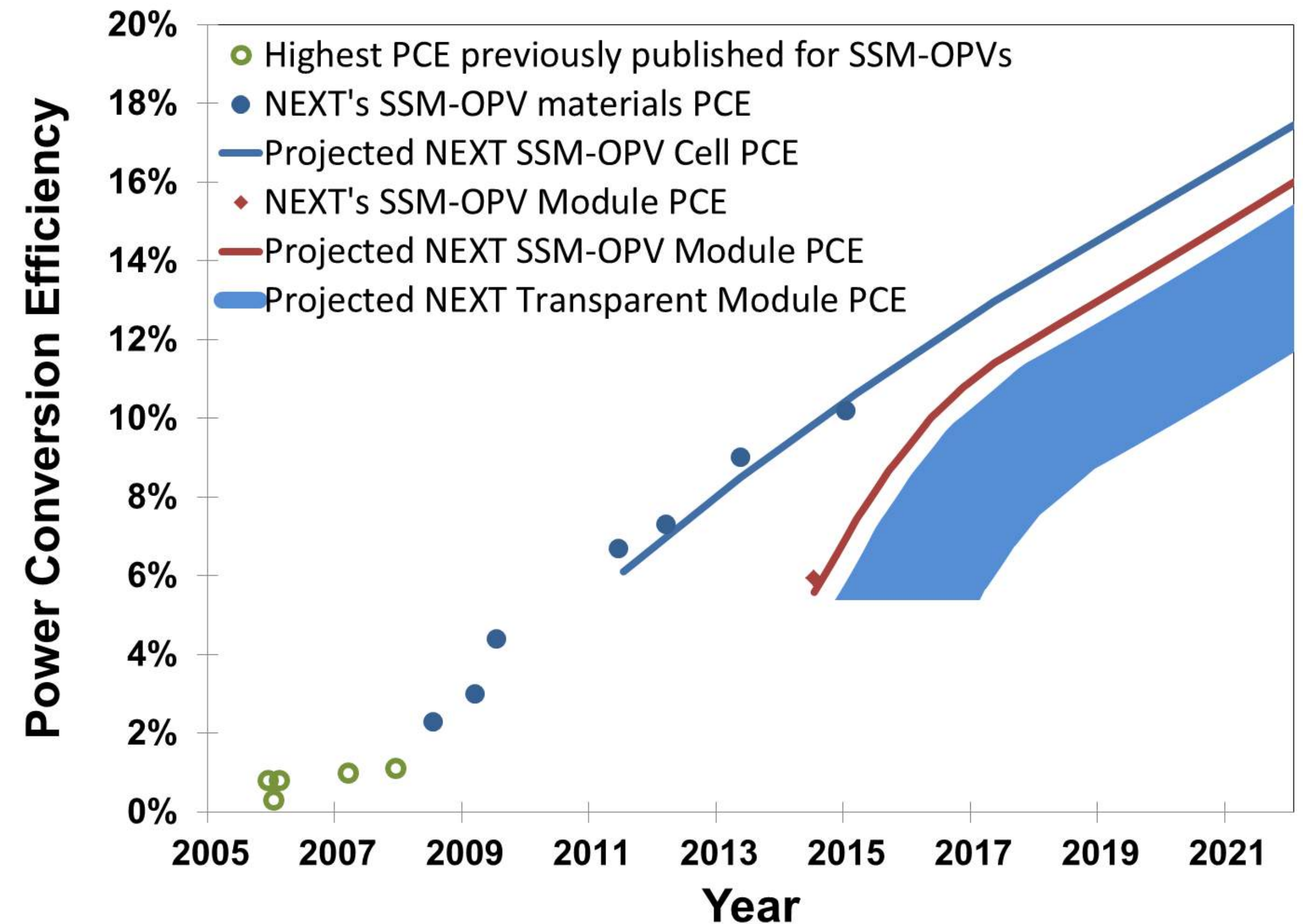




# COMPELLING PRODUCT EFFICIENCIES

## *A clear path to viable product efficiencies for NEXT's transparent solar coatings*

- NEXT's materials have reached efficiencies of over 9% for single junction cells validated by UCSB.
- Substantial progress made on tandem junction (15%+ potential). NSF Phase II work : Tandems. Over 10% PCE demonstrated
- With transparent top electrode efficiencies are (60-90%) of shown efficiencies depending on device configuration and transparency. ~8% PCE with 25% VLT demonstrated





# COMPETITIVE ADVANTAGE

NEXT's Energy Harvesting Window Offers Best-in-Class Performance & Value

## Transparency

**30-50%** Visible Light  
Transmission in Blue

## Efficiency

**8-10%** Power  
Conversion Efficiency

## Lifetime




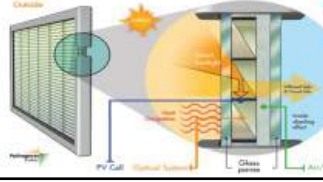





**25-30 year**  
Product Lifetime

## Cost

**\$30 per m<sup>2</sup>**  
Incremental IGU Cost



# BIPV WINDOWS: COMPETITIVE LANDSCAPE

Technology	Companies	Example	Details/Specs	
<b>NEXT ENERGY TECHNOLOGIES, INC.:</b>				
SSM-OPV	NEXT		Transparency	● HIGH (30% - 50%)
			Attractiveness	● Popular colors, Min. visual impact
			Projected PCE	● 10-15%
			Lifetime	● 30 yrs.
Cost	● Very Low			
<b>EXISTING MARKET TECHNOLOGIES:</b>				
Conventional opaque solar panels glazed together in tile format. Mono-, Multi-, or a-Si	Hanwha, Sapa, Mage Sunovation, Power World Solar Power, GH Solar, AGC Solar, Canadian Solar, ET Solar, Shenzhen Golden Glass BIPV, Scheuten Solar, Tenesol, Siliken, Kinmascsolar		Transparency / Attractiveness	● Very Low / ● Very low, Patterned
			Efficiency / Lifetime / Cost	● 5% - 20% / ● 30 yrs. / ● High
Thin film a-Si: Pattered, perforated, or very thin	Sharp, Sungen Solar, Schott North America, Onyx Solar, Solaria		Transparency / Attractiveness	● Very Low (10-20%) / ● → ● Haze, color
			Efficiency / Lifetime / Cost	● 6% - 9% / ● 30 yrs. / ● High
Structured Solar	Pythagoras-Solar		Transparency / Attractiveness	● High / ● Like blinds
			Efficiency / Lifetime / Cost	● Angle Dependent / ● 30 yrs. / ● High
<b>OTHER PRE-COMMERCIAL TECHNOLOGIES:</b>				
Polymer based OPV (Major development barriers)	Solamer, New Energy Technologies, Konarka :now defunct. (Also in polymer based OPV, but not clearly BIPV: Eight19, SolarPress)		Transparency / Attractiveness	● High / ● High Potential
			Projected PCE / Lifetime / Cost	● 10-15% / ● Low / ● Low
Vapor deposited small molecule based OPV	Heliatek, Ubiquitous		Transparency / Attractiveness	● High / ● High Potential
			Projected PCE / Lifetime / Cost	● 10-15% / ● 30 yrs. / ● High
DSSC	Sharp, Dyesol, (Also in DSSC, but not clearly BIPV: Sony, Solaronix, SolarPrint, G24i) *Higher PCE DSSCs use liquid electrolytes		Transparency / Attractiveness	● High / ● High Potential
			Projected PCE / Lifetime / Cost	● 8-10%* / ● Low / ● High
Perovskite: Pattered, perforated, or very thin	Oxyford Photovoltaic. †PCEs of ~20% achieved for non-transparent devices		Transparency / Attractiveness	● Low / ● → ● Haze and/or unfavorable color
			Projected PCE / Lifetime / Cost	● 8-10%† / ● Very Low / ● Low
Thin film CdTe: Pattered, perforated, or very thin	Lucintech		Transparency / Attractiveness	● Low / ● → ● Haze and/or unfavorable color
			Projected PCE / Lifetime / Cost	● 8-10%* / ● High / ● High



# ATTRACTIVE MODULE DESIGN



Transparent OPV module made by Konarka (left) and NEXE (right)



# COMPELLING ECONOMICS

## NEXT's Transparent Solar Windows Deliver Outstanding Value to Buildings



Sample California building with 60% coverage on south, west & east

Annual GHG emissions reduction of 130 MT

\$75,000 - estimated annual value of electricity generated (savings)

2 year simple payback and 60% IRR

Generates 15-20% of total annual electric load and 7.5-10% at peak

Opportunity for meeting NET ZERO and peak shaving targets



# BILLION DOLLAR OPPORTUNITY

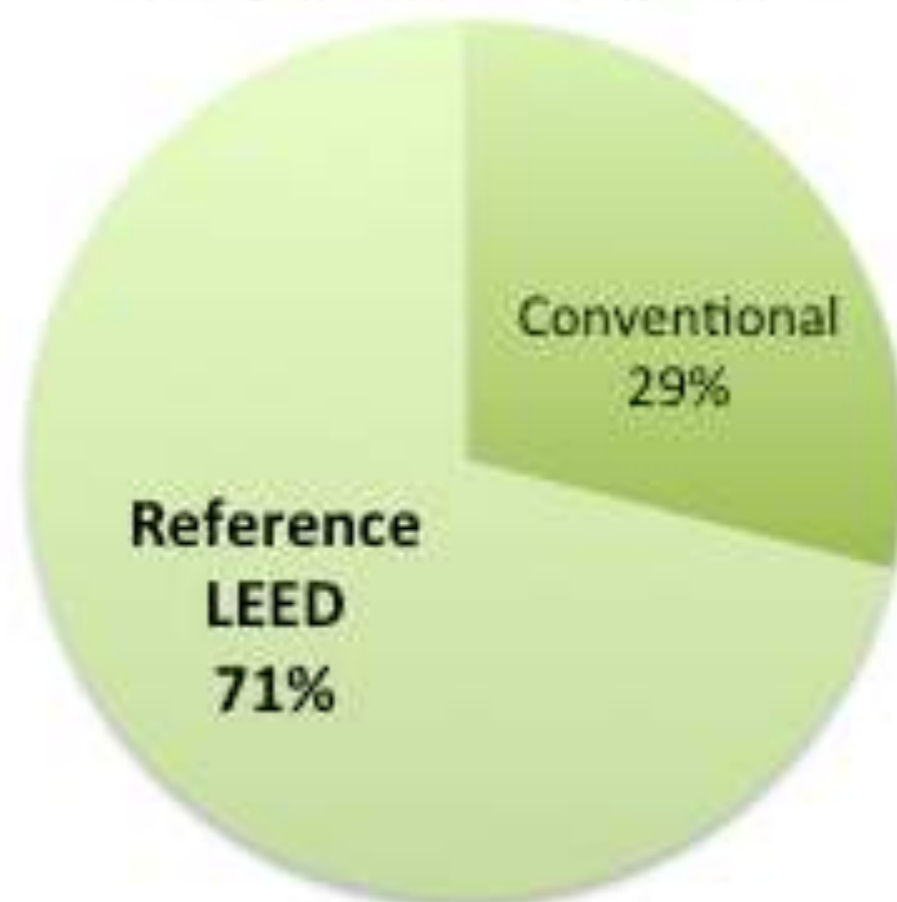
## Large Global Market with Increasing Share of Energy Efficient Windows

**\$55 Billion & 50 Billion ft<sup>2</sup>** – Annual value and volume of global flat glass production for commercial buildings

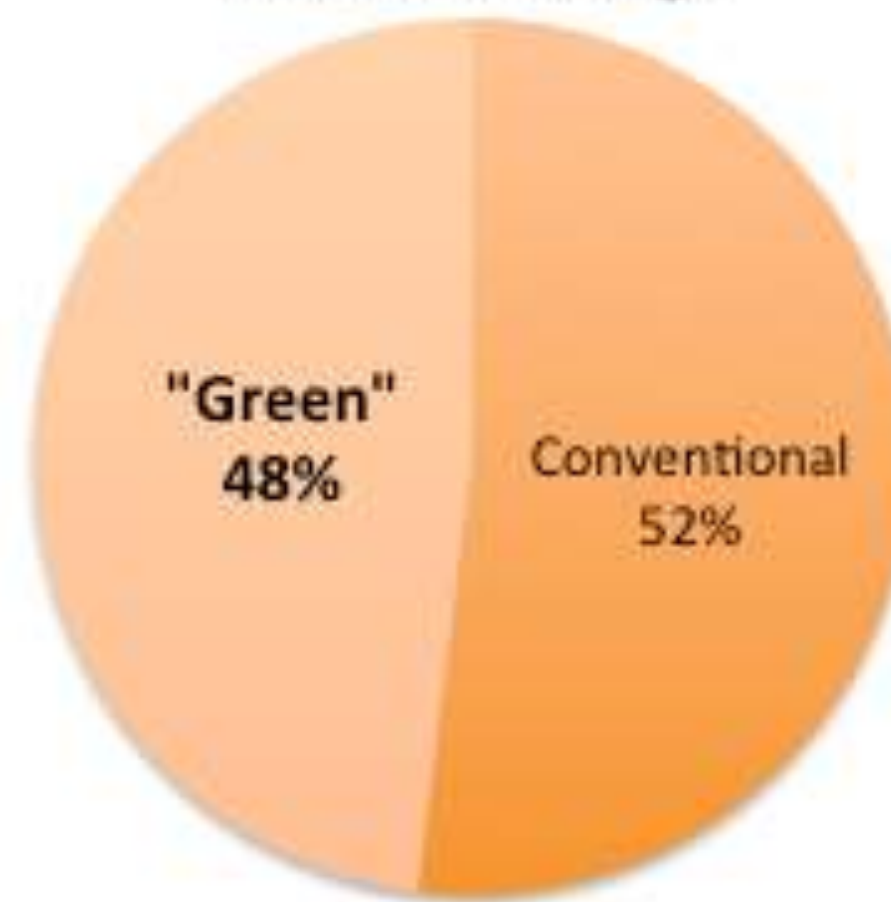
**\$0.5 Trillion** – Annual value of global fabricated windows for commercial buildings

## GREEN Buildings: Large Addressable Market for an Energy Harvesting Window Product

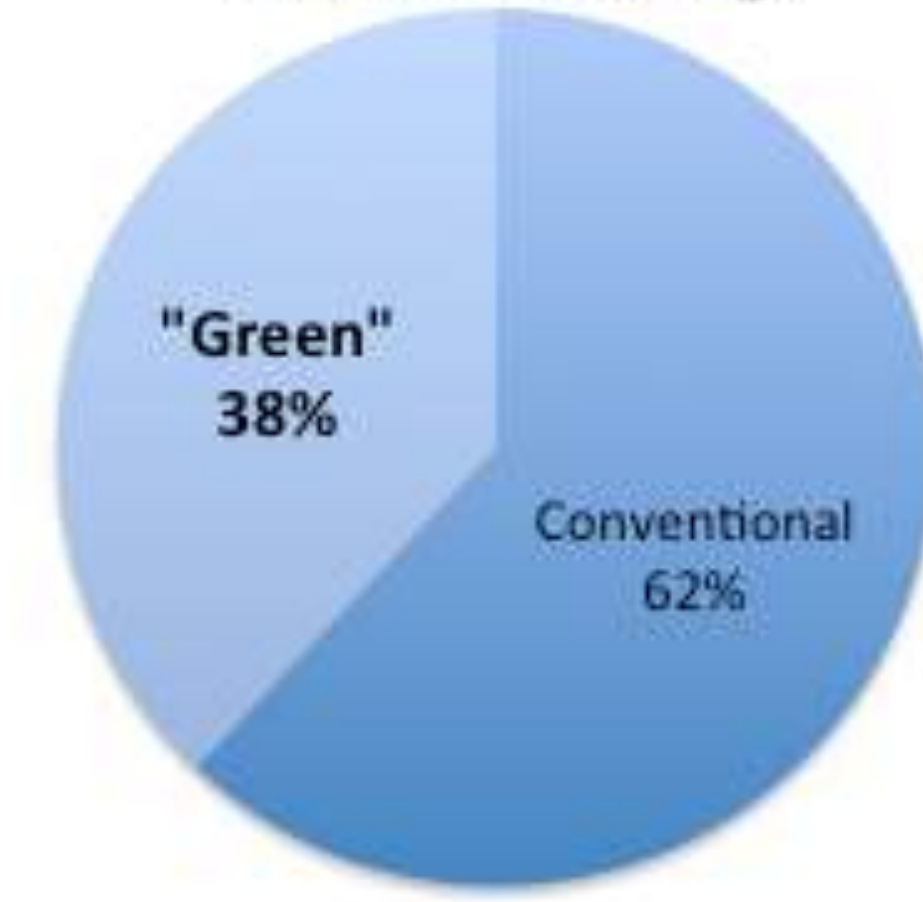
Large U.S. Projects



U.S. Buildings



Global Buildings





# BUSINESS MODEL & EXIT



## Joint Venturing and Business-to-Business Sales

Sales of transparent solar window technology and services to glass manufacturers and fabricators of insulated glass units (IGUs) - windows.



## Exit to Corporate Strategic Partner

Various exits possible including target for acquisition by glass companies, chemical companies or one of the large solar companies.



# COMPANY AT A GLANCE



Founded in **2011**  
*Santa Barbara, CA*



**World Class Team** of Proven Technologists with Deep Experience  
(14 Total – 7 Ph.D.s)



**Exclusive** License to Key Patents & Freedom to Operate

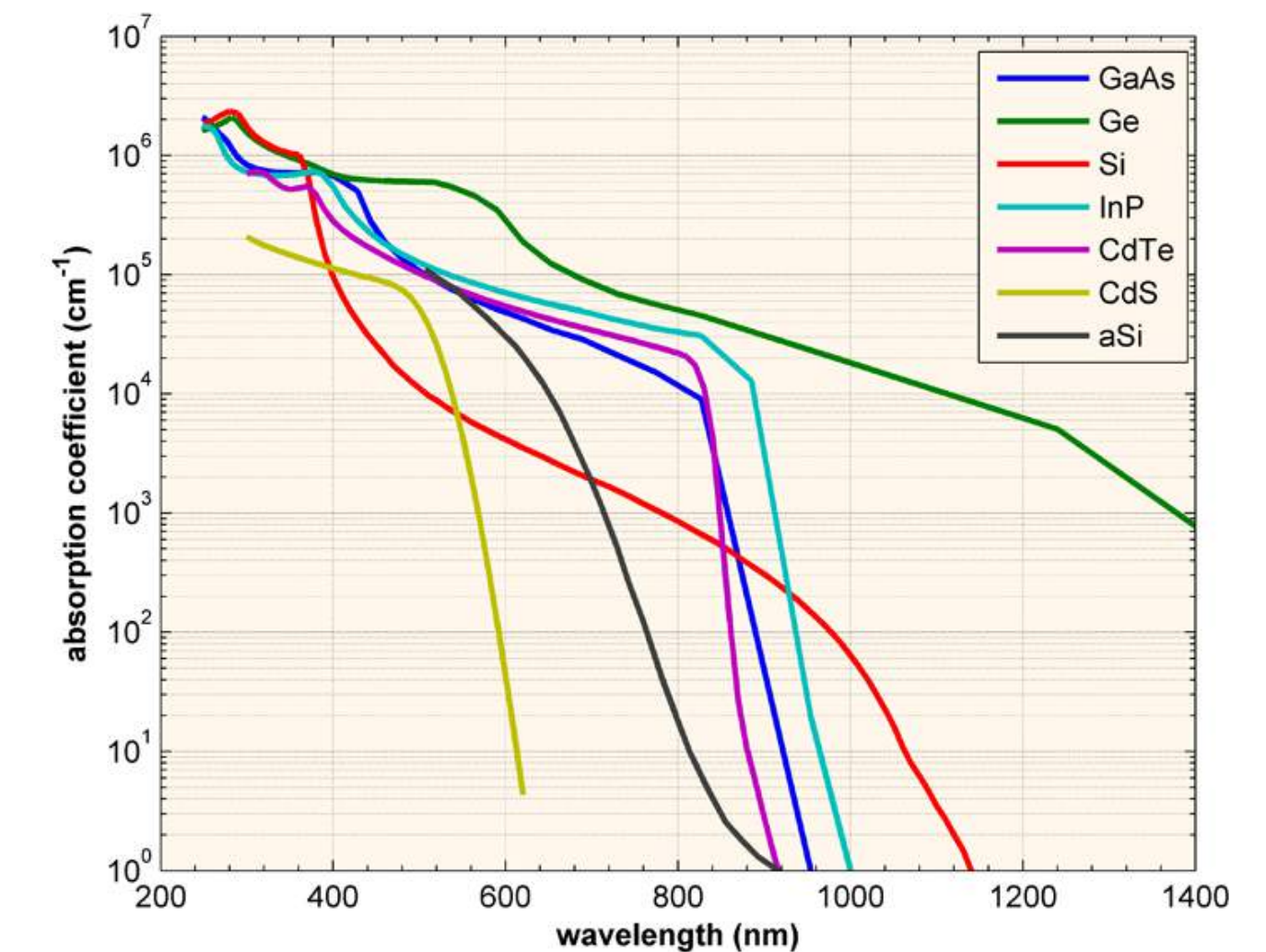
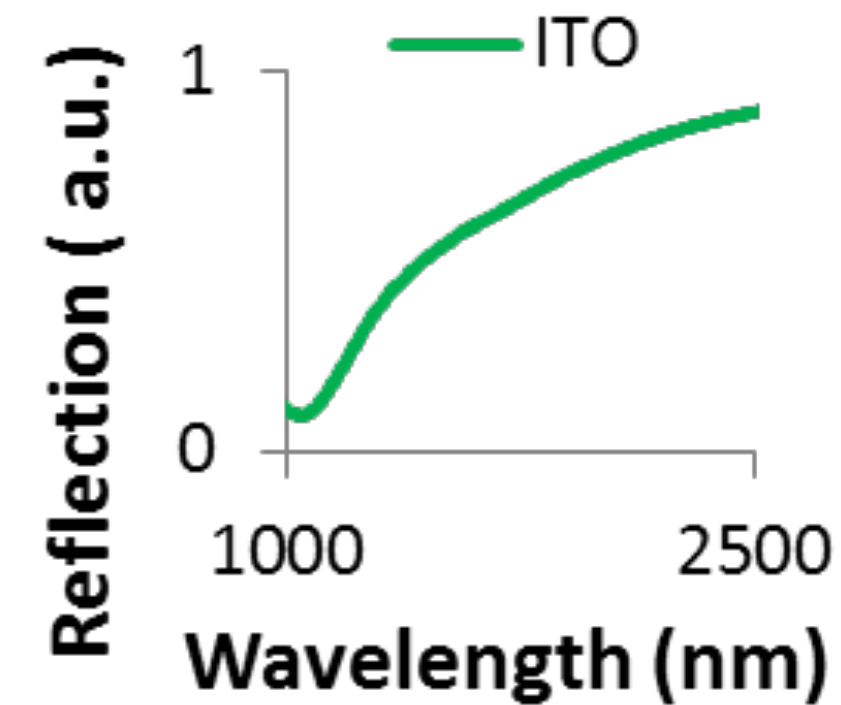
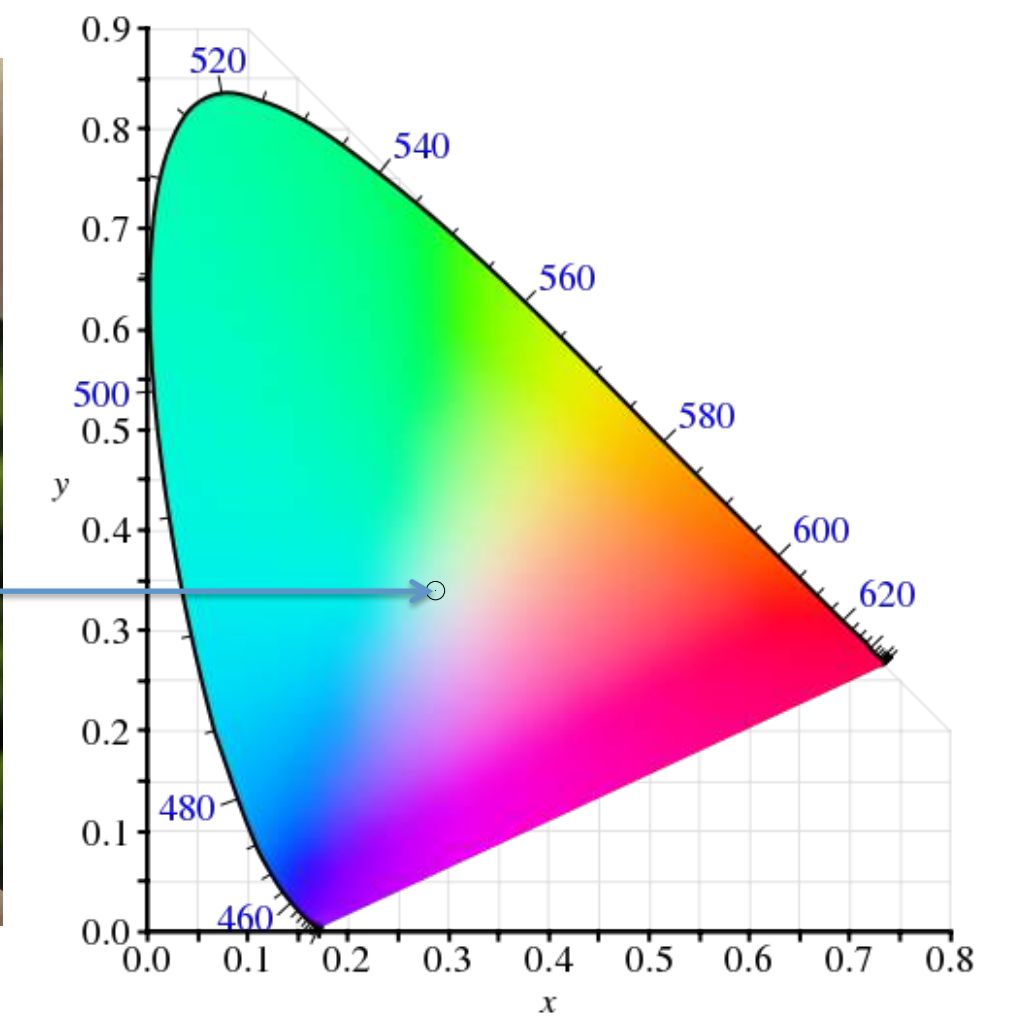
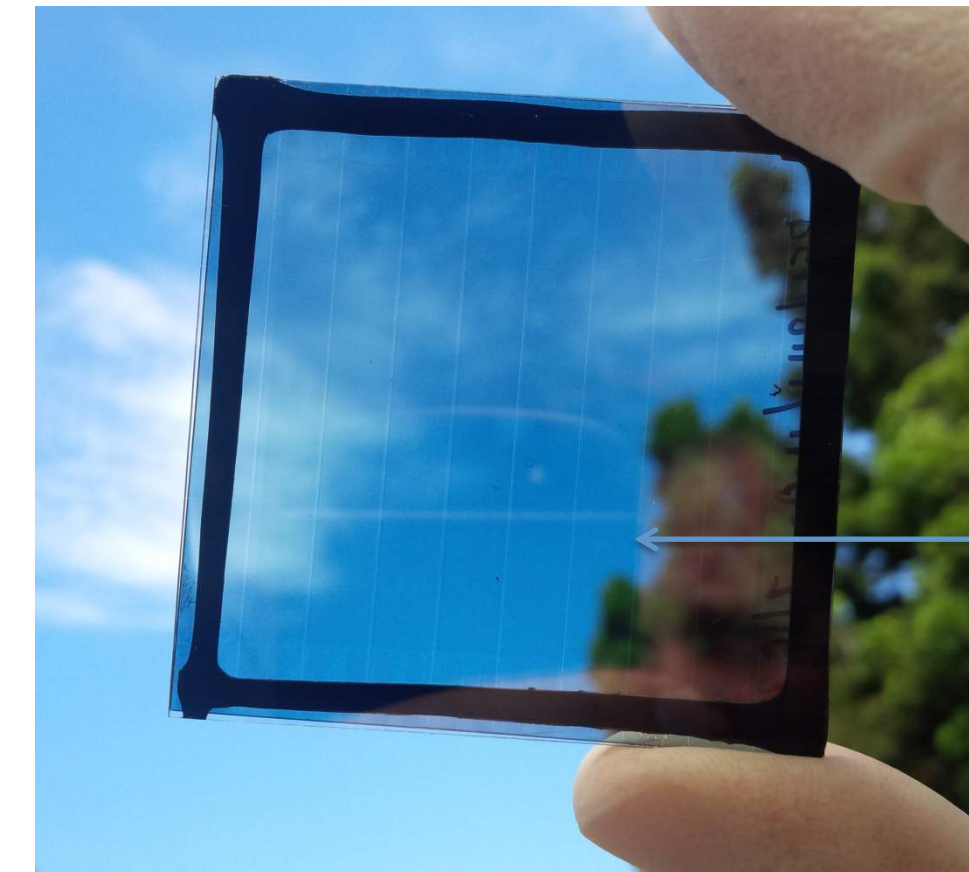
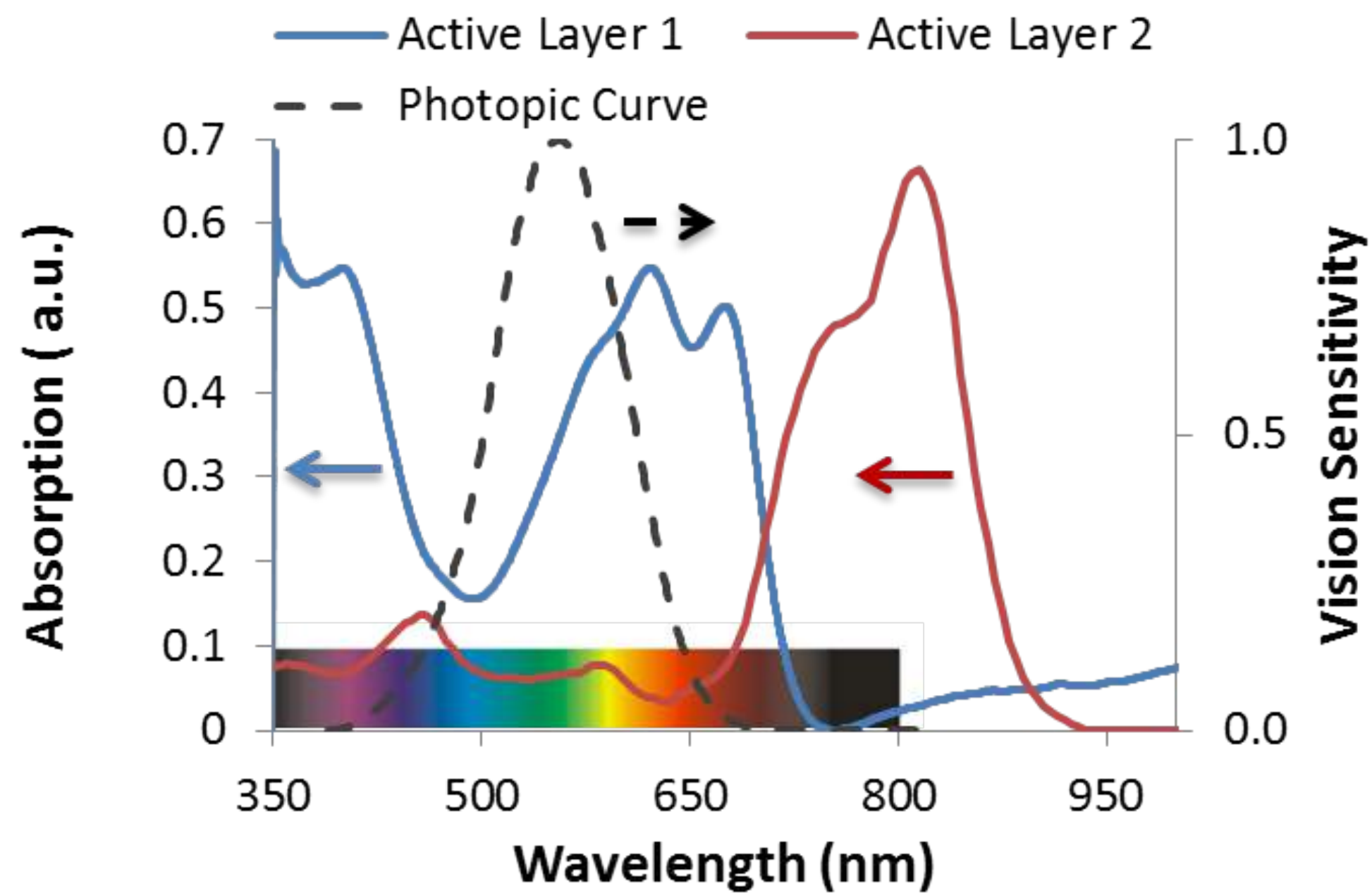


Initial Technology Developed at UC Santa Barbara  
**#1-Ranked** Materials Program



# WINDOWS REQUIRE TRANSPARENCY

*Unlike Conventional 1<sup>st</sup> and 2<sup>nd</sup> generation Solar NEXT SSM-OPV has color tunable properties and can absorb light in chosen spectrum only.*



*NEXT's coatings (active layers) have low absorption in blue resulting in good transparency for the human eye (photopic vision)*



# ENERGY GENERATION

	Sacramento				Average over 4 CA locations			
	8% PCE		12% PCE		8% PCE		12% PCE	
	kWh/ft <sup>2</sup>	MWh/year	kWh/ft <sup>2</sup>	MWh/year	kWh/ft <sup>2</sup>	MWh/year	kWh/ft <sup>2</sup>	MWh/year
<b>South</b>	9.56	215	14.3	322	9.59	215	14.4	323
<b>East</b>	8.24	123	12.4	185	7.6	114	11.4	171
<b>West</b>	7.96	119	11.9	179	8	120	12	180
<b>Total</b>		457		686		449		674

- The baseline building in Sacramento (60% IGU façade coverage on 3 façades of a 12 story 2013 Title 24 standard compliant ~500k ft<sup>2</sup> office building) consumes 3524 MWhs per year.
- At 8% PCE the IGUs would reduce total consumption 13.0%, and a peak reduction of 7.0% in this building.
- At 12% PCE the IGUs would reduce total consumption 19.5%, and a peak reduction of 10.4% in this building.

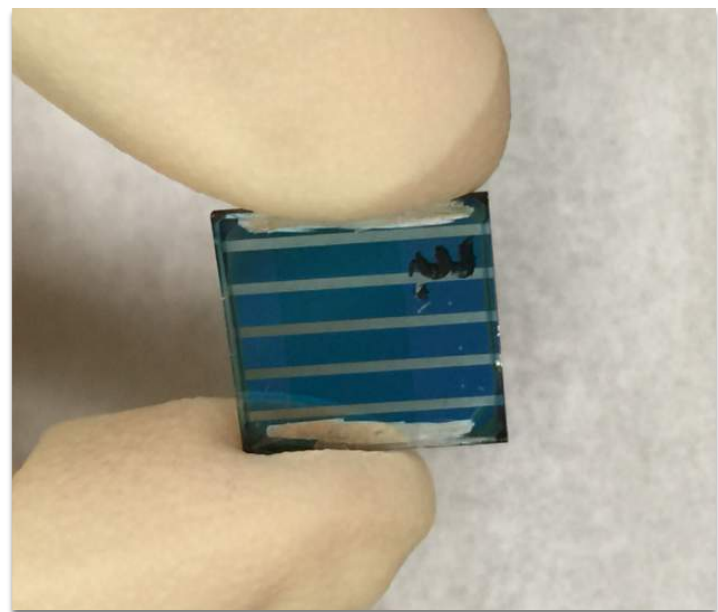
EnergyPlus was used to include the IGUs on the standard compliant (2013 Title 24) large office building model distributed with the California Building Energy Code Compliant (CBECC 2013-2) software. The EnergyPlus *Simple Model* was used and was found to be a good model for OPV where PCE remains relatively constant with intensity. Comparing the difference in annual energy generation for the different building sides of the *Simple Model* used to represent our OPV modules to the c-Si *One-Diode Model* led the same difference between c-Si and OPV as was measured by Heliatek and AGC Glass Europe. Sacramento (SACRAMENTO-EXECUTIVE\_724830\_CZ2010), San-Francisco (SAN-FRANCISCO-INTL\_724940\_CZ2010), San Diego (SAN-DIEGO-LINDBERGH\_722900\_CZ2010) and (LOS-ANGELES-INTL\_722950\_CZ2010) were used as the representative cities to find the average.



# FINANCING ROUNDS & MILESTONES

(ACHIEVED)

## \$2M SEED

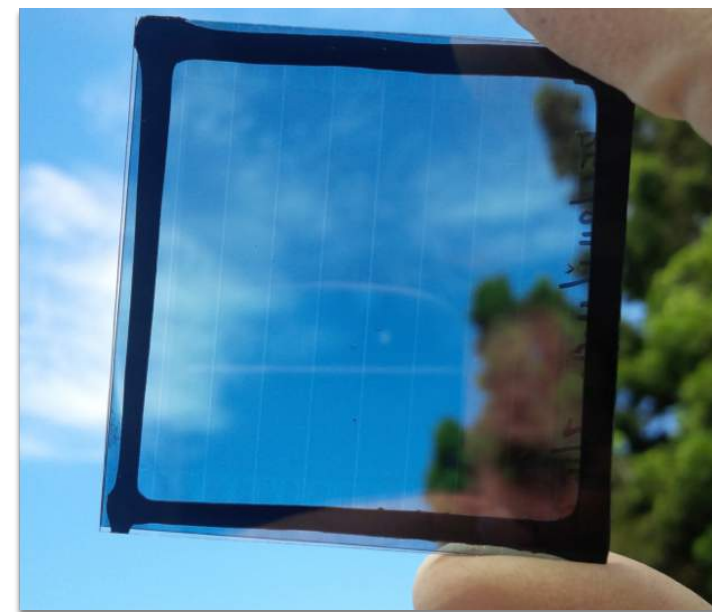


### Lab Scale Prototypes of >7% PCE

- Increased Device PCE from ~3% to >7%
- Small Device Sizes
- Built Out R&D Facility & Team

(ACHIEVED)

## \$2M Series A and \$1.25M Grant Funding



### Dramatic Improvements in PCE and Lifetime

- Increased Device PCE from ~7% to >10%
- Demonstrated Feasibility of 25-30 Year Lifetimes
- Transparent Back Electrodes & Modules
- Tandem Layer Devices
- ~6% PCE for Transparent Devices



### Functional Transparent Demonstrators

- Larger Scale Devices & Modules
- Fully Solution Processed
- Good Visible Light Transmission / Low Haze
- >99% Geometrical Fill Factor
- Encapsulated Modules

## \$7M Series B



### 12"x 12" Architectural Samples

- 8-10% Module PCE
- 30-50% Visible Light Transmission
- 25-30 Year Lifetimes
- Fully Commercially Relevant Process

## \$9M Series C



### Commercial Production

- Up to 5' x 10' IGU Sizes
- 8-10% PCE of PV-IGU
- 30 Year Lifetimes
- 30-50% Visible Light Transmission