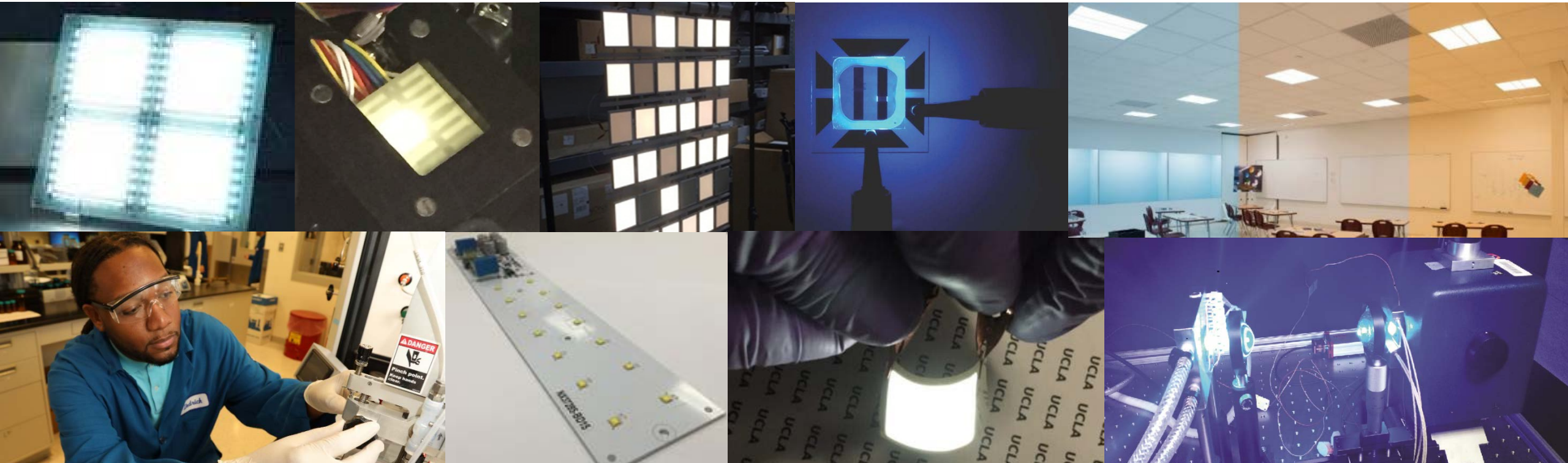
U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SSL R&D Workshop Welcome

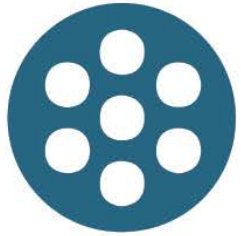
James R. Brodrick, Ph.D., Lighting Program Manager

January 29, 2018



Results-Oriented R&D

290
Patents



260
Products

469
tBtu

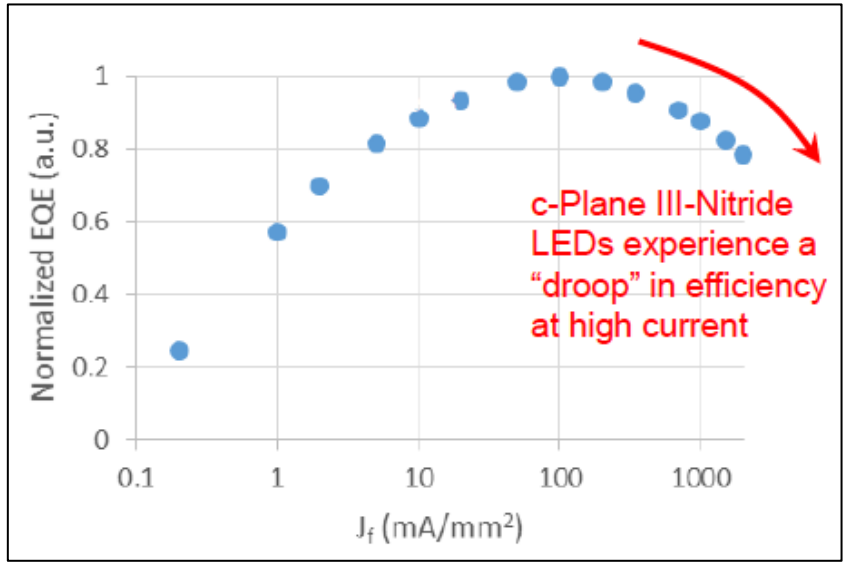
4.7
Billion

Looking Forward

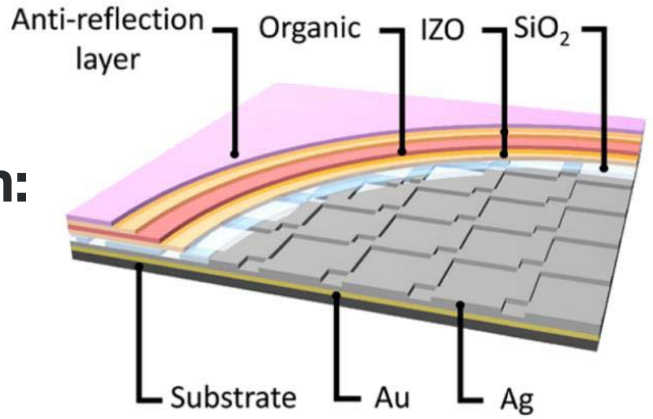
	LED	OLED
Goals	255lm/W pc-LED (327lm/W cm-LED) 218lm/W luminaire pc-LED	190 lm/W panel 162 lm/W luminaire
Challenges	Droop Phosphors Green gap	Light extraction Stable blue emitter Integration
	Spectral control, connected lighting, physiological responses, glare, application efficiency	
Payout	5.1 quads, $50B annual savings in 2035	

https://energy.gov/eere/ssl/technology-roadmaps; https://energy.gov/eere/ssl/ssl-forecast-report

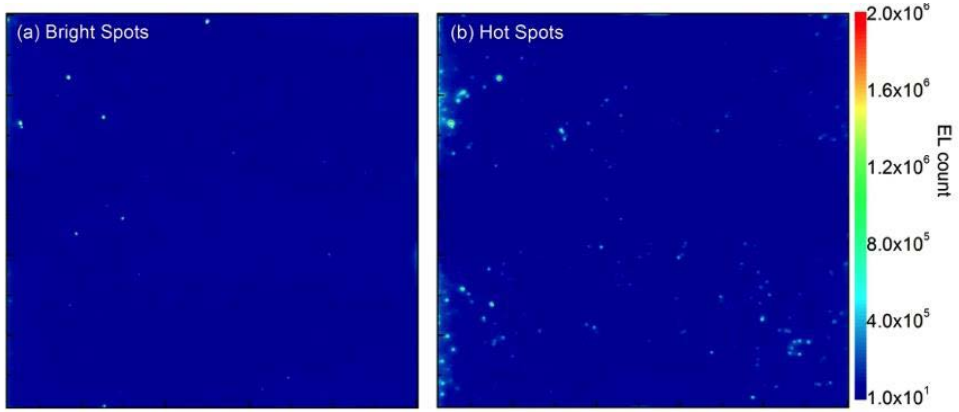
Remaining Challenges Are Harder



Lumileds: Droop reduction for improved InGaN LED system efficacy



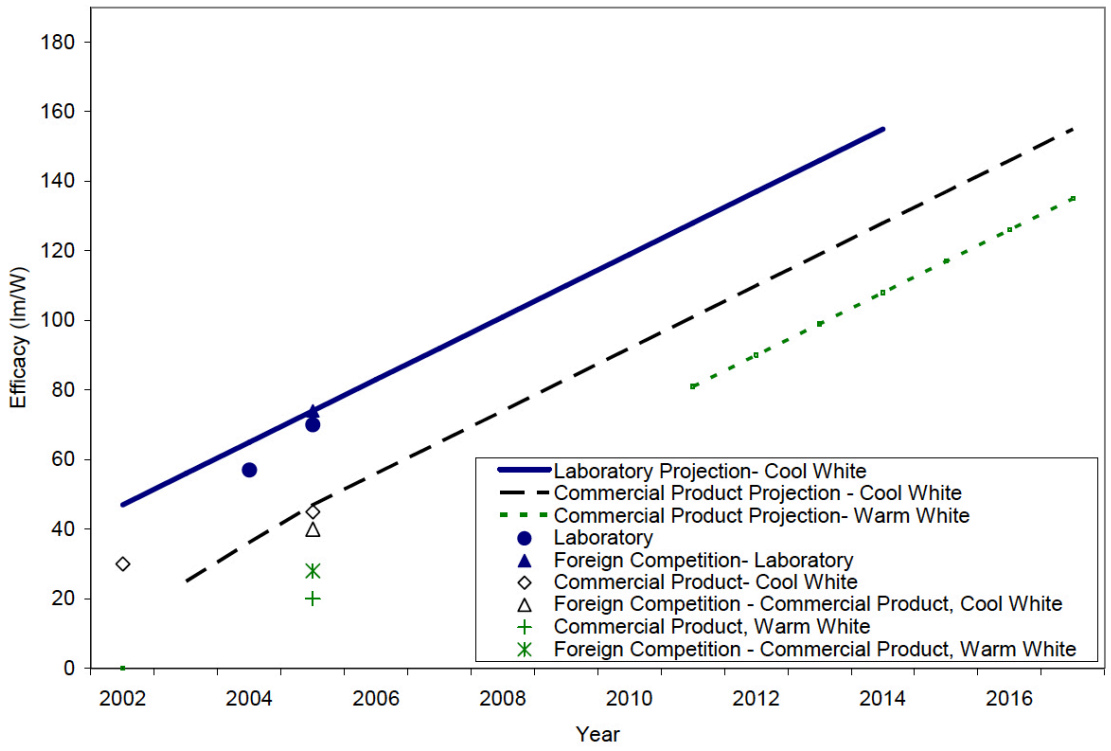
University of Michigan: Innovative method to increase OLED light extraction efficiency



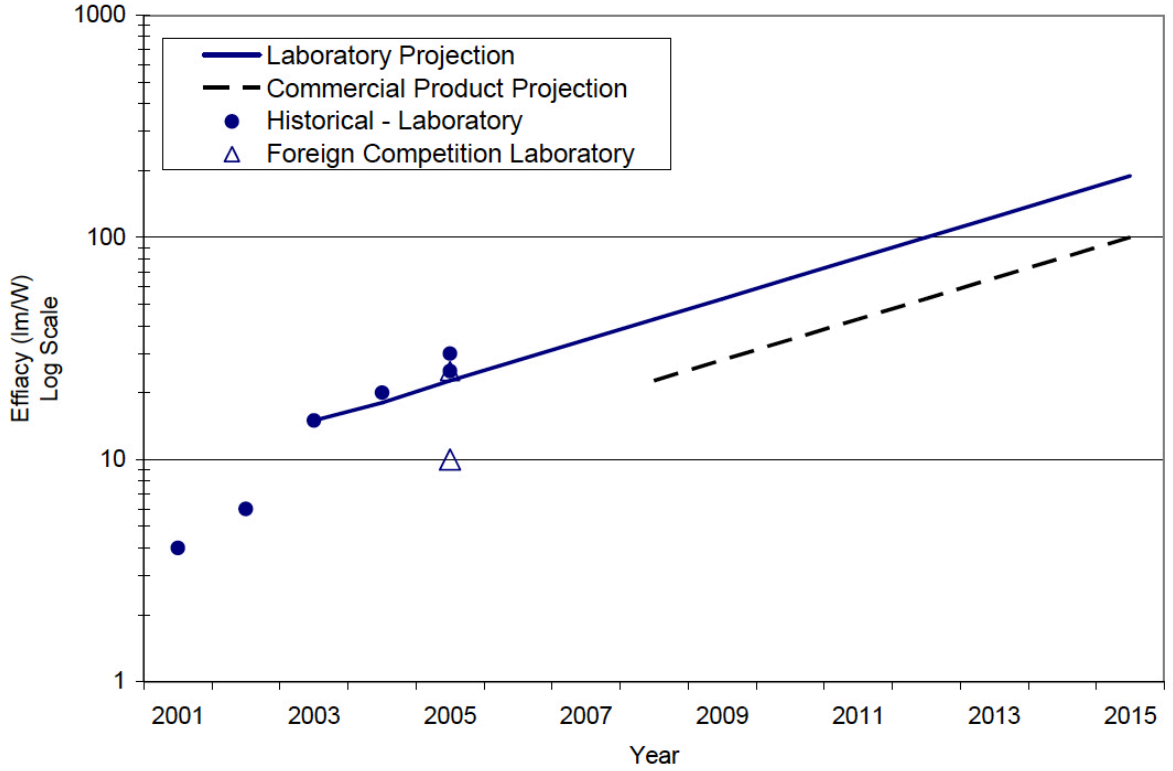
Penn State University: Basic scientific understanding of catastrophic shorts in OLED panels

Why We Are Here?

A Look Back: 2006 Program Targets



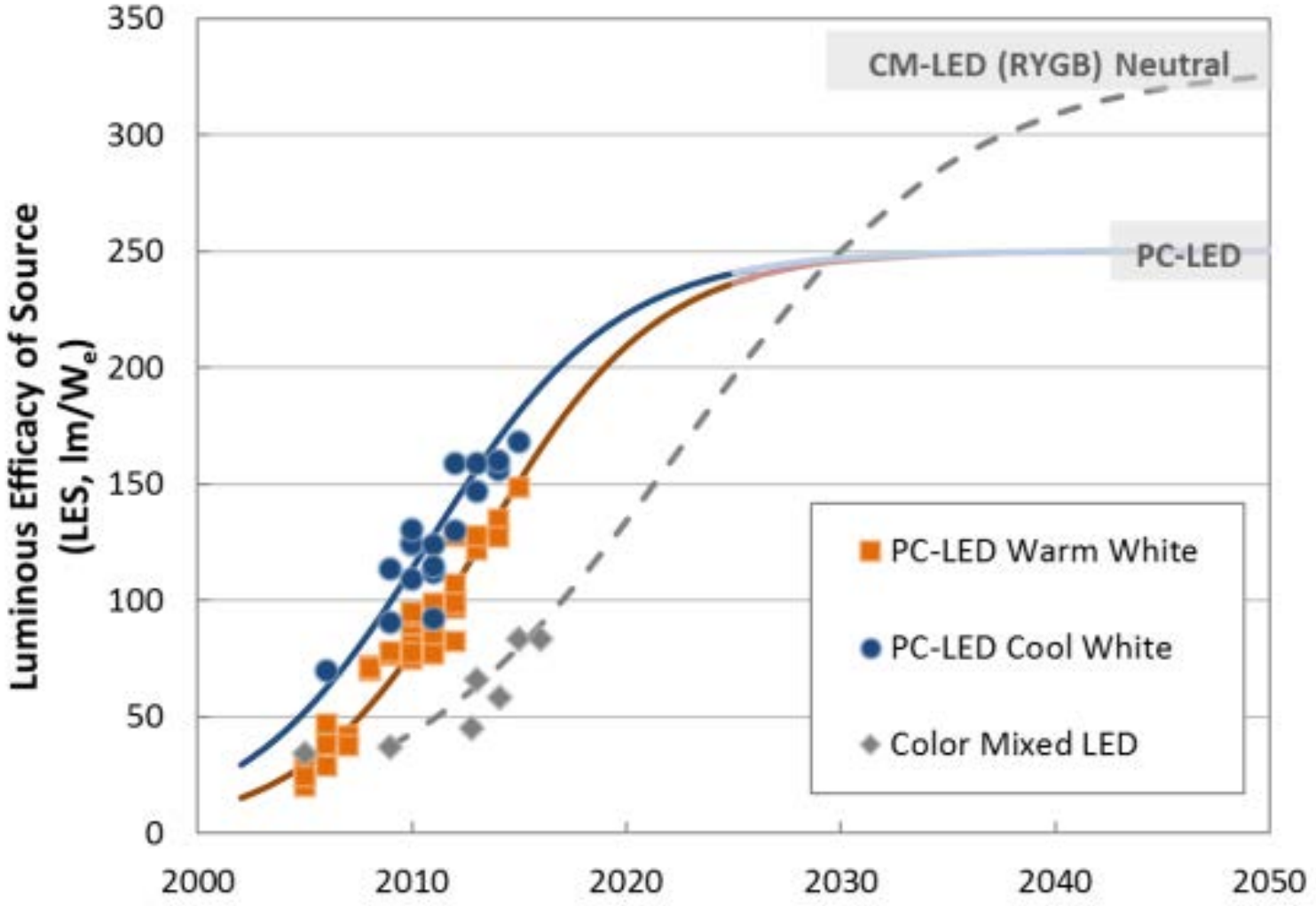
White Light LED Device Efficacy Targets, Laboratory and Commercial



White Light OLED Device Efficacy Targets, Laboratory and Commercial

Solid-State Lighting Research and Development Portfolio, Multi-Year Program Plan FY07-FY12

2017 LED Program Targets

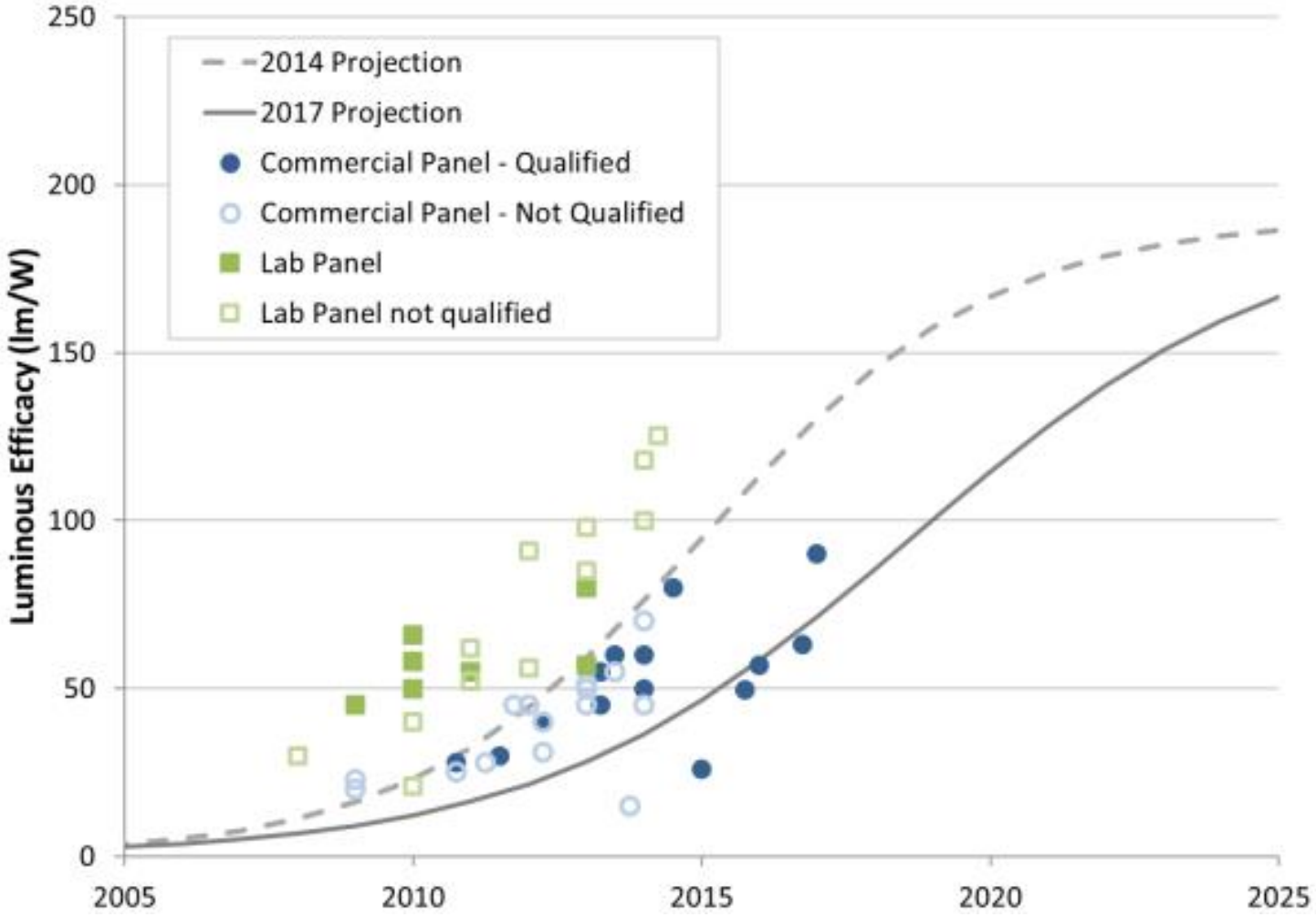


Best performing LEDs are only halfway to DOE goals

Significant technology development headroom remains

https://energy.gov/eere/ssl/downloads/solid-state-lighting-2017-rd-plan-suggested-research-topics

2017 OLED Program Targets

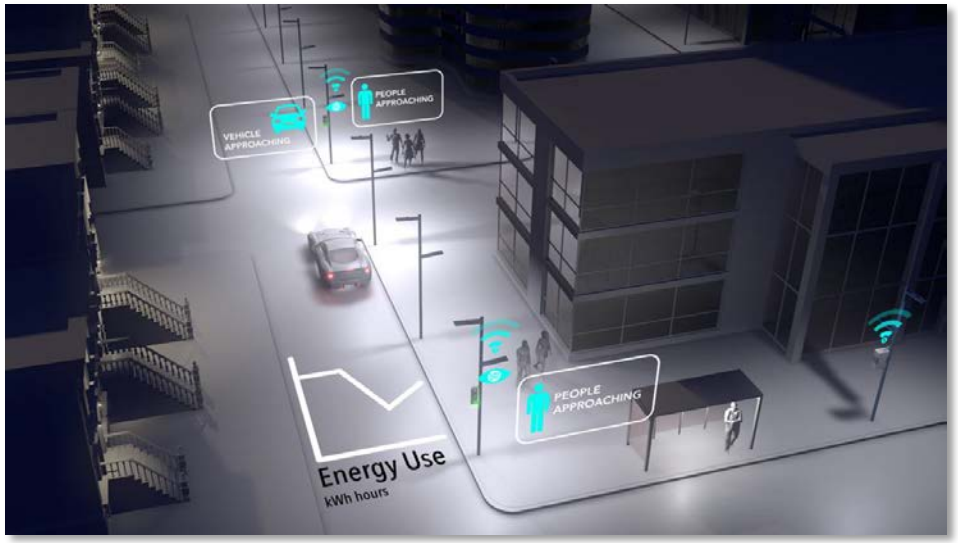


Significant potential to meet goals

Enabling technologies (materials, light extraction, anodes, encapsulation) have been demonstrated, but need to be integrated in low-cost manufacturing processes

https://energy.gov/eere/ssl/downloads/solid-state-lighting-2017-rd-plan-suggested-research-topics

New Opportunities Challenge Old Thinking



What research is needed to fill technology gaps?

Three Packed Days: A "Meeting of the Minds"

"Valuable gathering of some of the best/most advanced minds in lighting, with great intellectual exchanges and excellent informational presentations."

– Workshop attendee

Three Packed Days: Track Sessions Take a Closer Look

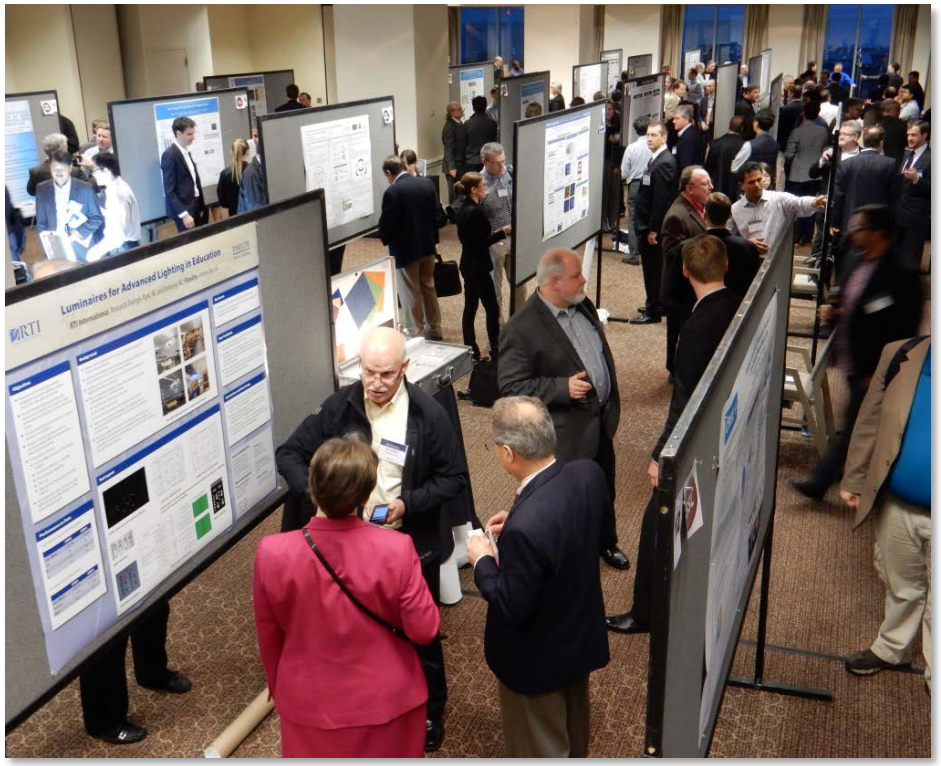
LED track sessions…

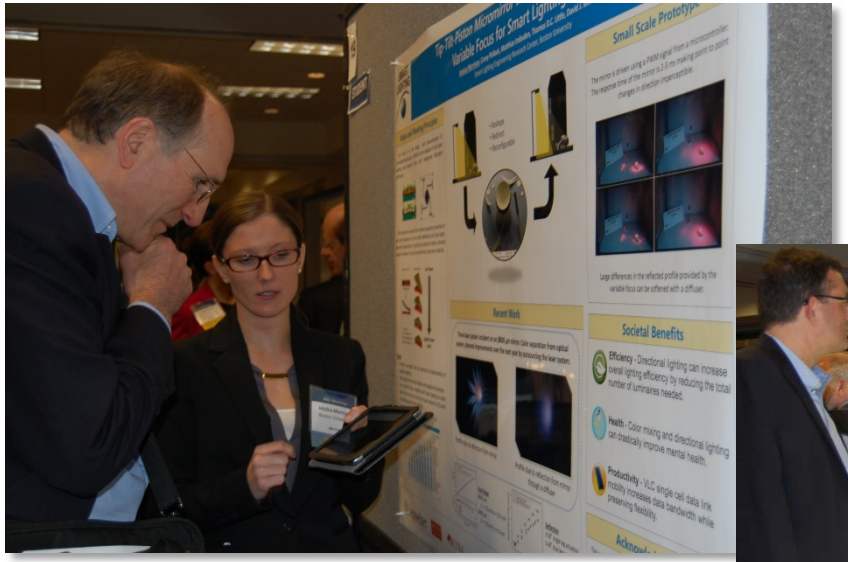
Examine issues around LED and downconversion materials, new source and optical control methods, and the latest lighting science research

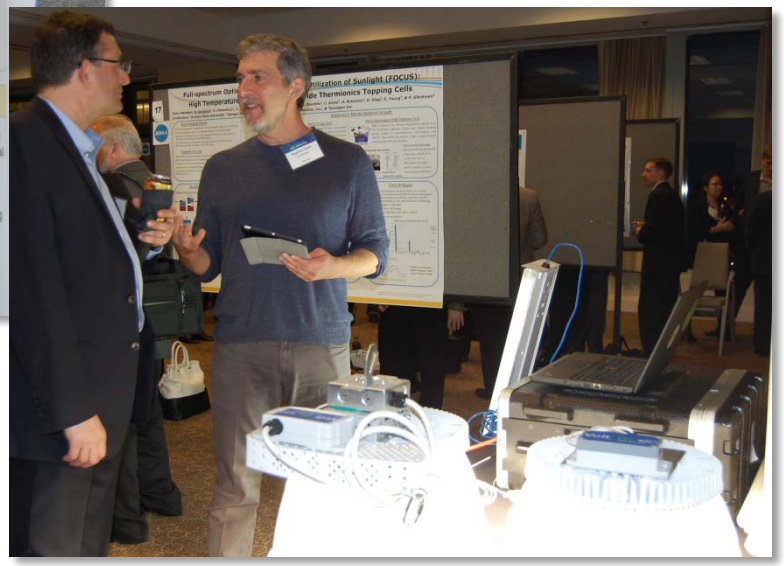
OLED track sessions…

Examine the latest advances in OLED materials and components, OLED panel integration needs, and advanced concepts for OLED manufacturing

Three Packed Days: Poster Session



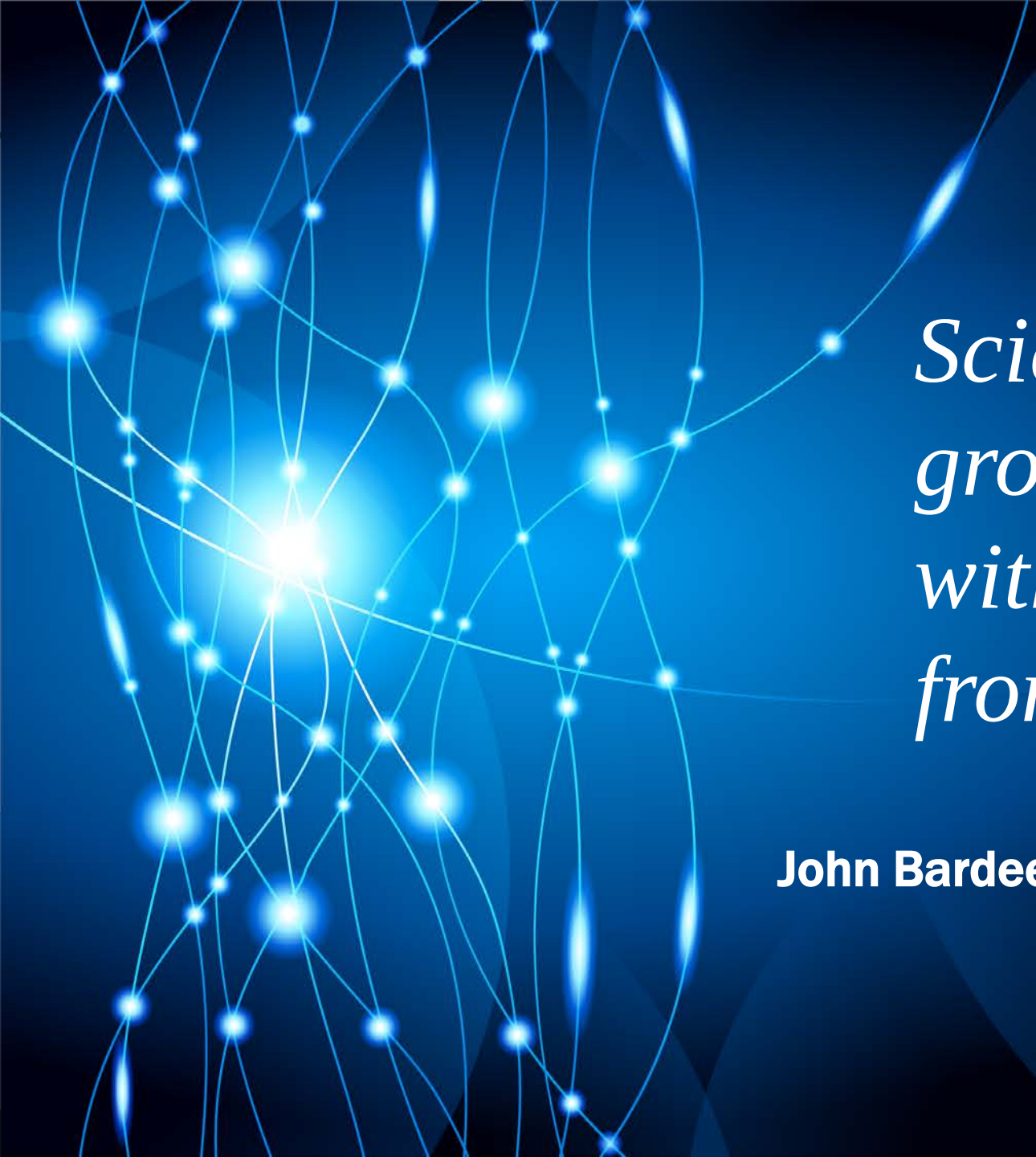




Highlighting the work of >40 of today's leading SSL scientists

Opportunity for one-on-one discussions

The Next Nobel Prize?



Science is a field which grows continuously with ever expanding frontiers.

John Bardeen, Nobel Prize in Physics (1956 and 1972)