

2014 Solid-State Lighting R&D Workshop

R&D Program Direction

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U.S. Department of Energy

DOE Solid-State Lighting Program Mission and Goal

MISSION

Guided by a government-industry partnership, DOE's mission is to create a new, U.S.-led market for high-efficiency, general illumination products through the advancement of semiconductor technologies, to save energy, reduce costs, and enhance the quality of the lighted environment.

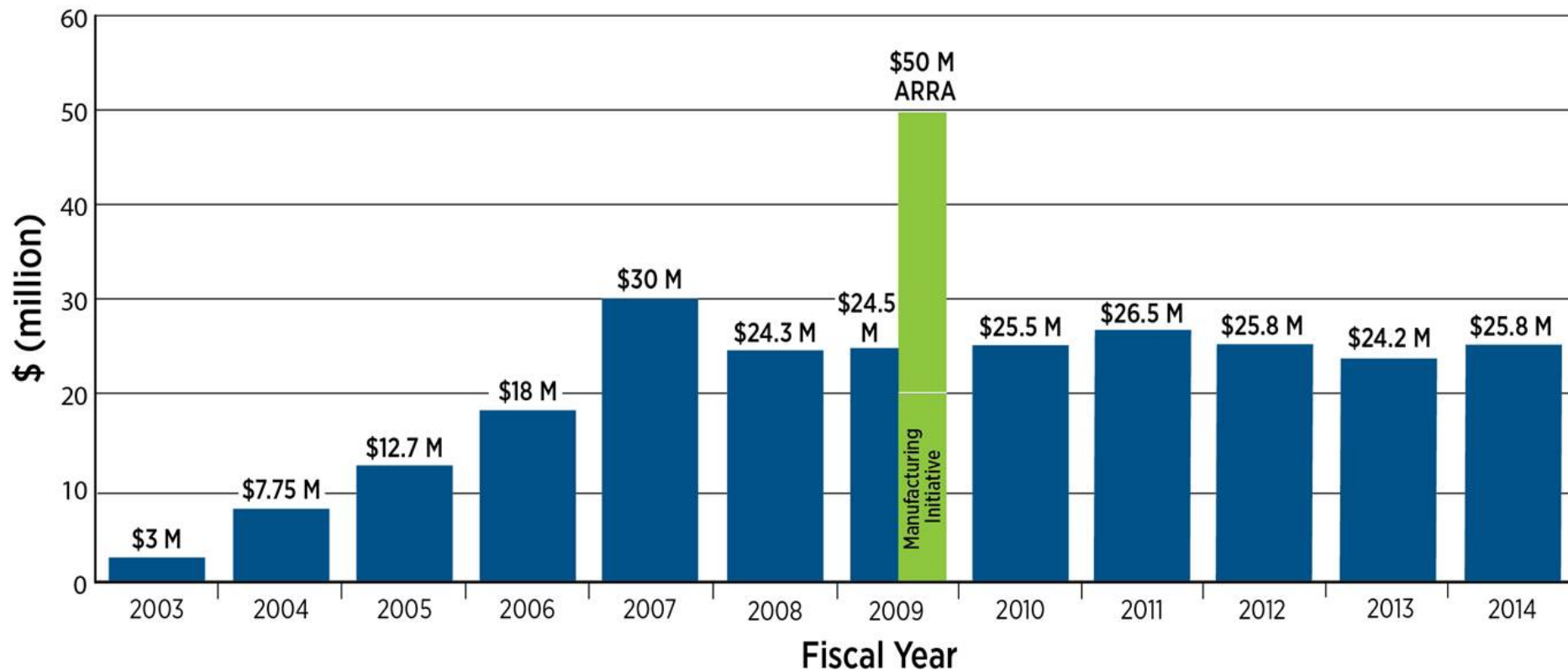
GOAL

By 2025, develop advanced SSL technologies that — compared to conventional lighting technologies — are much more energy efficient, longer lasting, and cost competitive, by targeting a product system efficiency of 50 percent with lighting that accurately reproduces sunlight spectrum.

Program Strategy and Planning

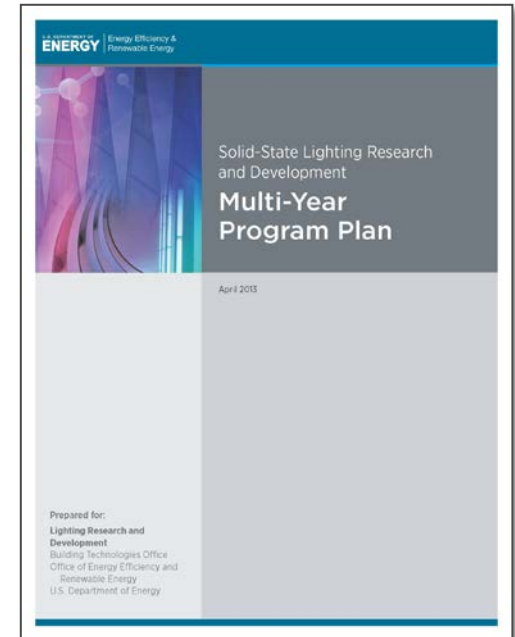


Congressional Appropriations



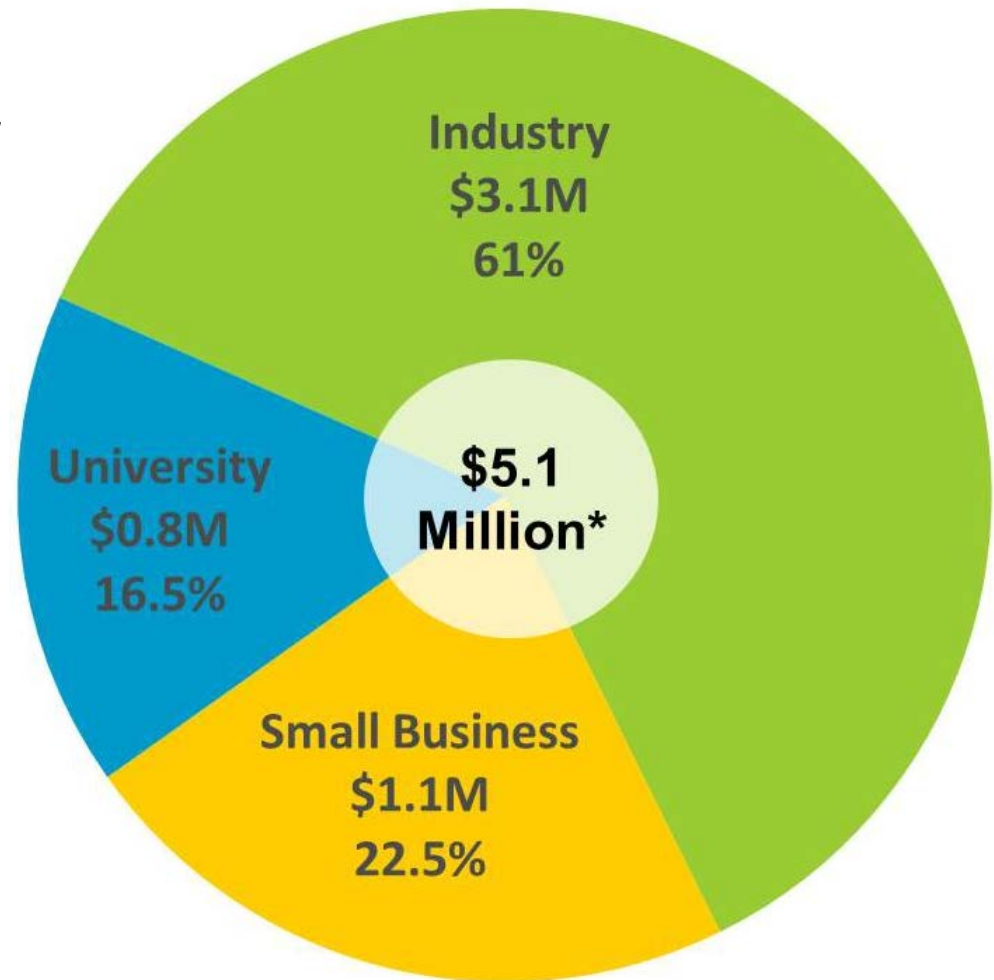
Funding Status

- FY12: Congressional direction on funds
 - Fully fund in first year
 - Manufacturing R&D projects only
- FY13: Continuing resolution
 - Manufacturing R&D projects only
- FY14: FOA released in December 2013
 - Core Technology
 - Product Development
 - Manufacturing R&D
- Your input guides Multi-Year Plan updates, strategic direction for both government and industry



Funding by Performer Type

Recipients of DOE funding for active Core Technology and Product Development projects



* Figures are rounded.

Core Technology Projects

Active LED Projects

Priority Task	# of Projects	Funding*
A.1.2 – Emitter Materials Research	1	\$968,000
A.6.3 – Optimizing System Reliability	1	\$2.1M

Active OLED Projects

Priority Task	# of Projects	Funding*
C.1.2 – Novel Materials	1	\$835,000

* Figures are rounded.

Product Development Projects

Active LED Projects

Priority Task	# of Projects	Funding*
B.3.4 – LED Thermal Management	1	\$150,000

Active OLED Projects

Priority Task	# of Projects	Funding*
D.2.2 – Electrodes	1	\$221,000
D.4.2 – Luminaire	2	\$391,000
D.5.3 – Power Supply	1	\$225,000
D.6.3 – Panel Outcoupling	1	\$150,000

* Figures are rounded.

Manufacturing R&D Projects

Active LED Projects

Priority Task	# of Projects	Funding*
Package Manufacturing	1	\$3.8M
Luminaire Manufacturing	3	\$12.7M
Test and Inspection	1	\$8.6M

Active OLED Projects

Priority Task	# of Projects	Funding*
OLED Deposition	1	\$2.1M
Yield Improvement	1	\$4.2M
Integrated Substrate Manufacturing	1	\$4.7M

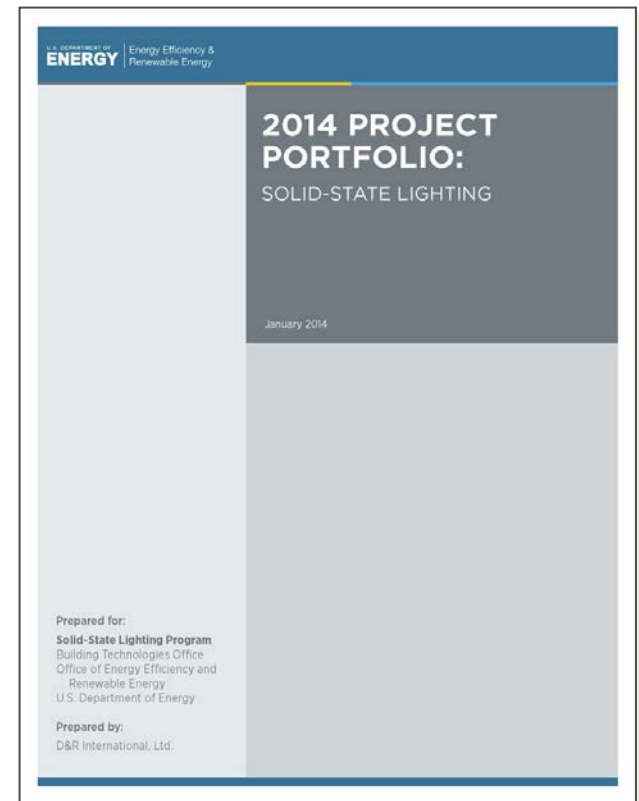
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SSL R&D Partnerships

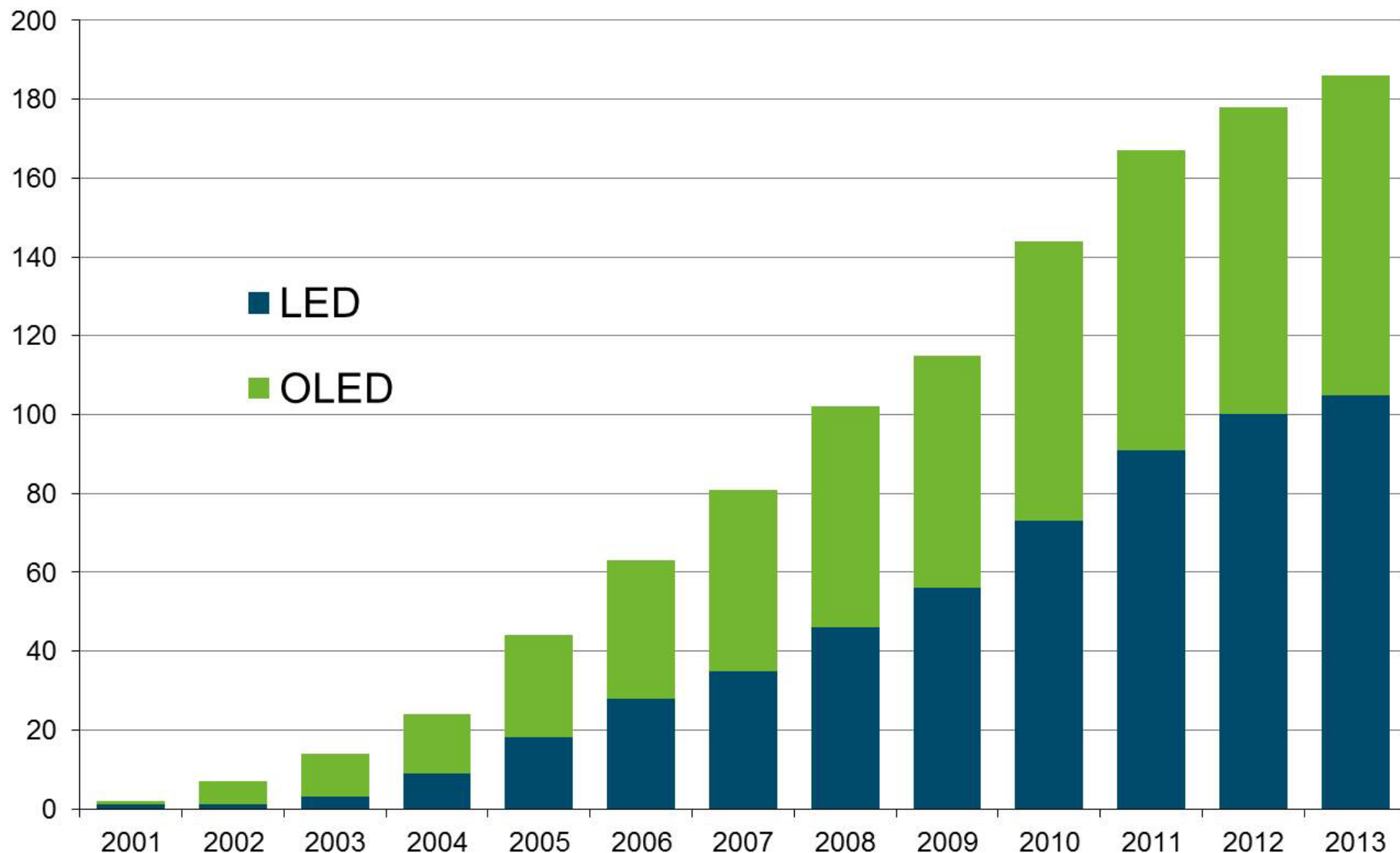


DOE SSL Portfolio

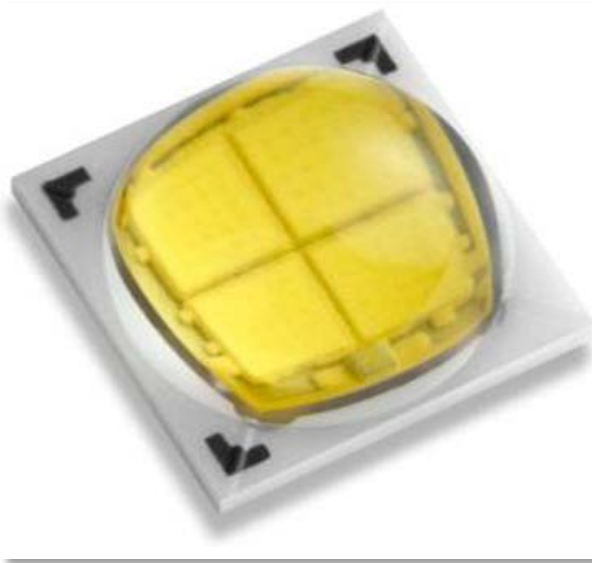
- Results-oriented R&D
- More than 200 projects funded since 2003, with hundreds of partners
- Total current project value: \$41.1M
 - OLED: \$12.8M (9 projects)
 - LED: \$28.3M (8 projects)
- Industry and university partners provide average of 33% cost share
- 2012: LED lighting saved 71 tBtu, equivalent to annual energy cost savings of about \$675M



Patents Resulting from DOE-Funded Projects

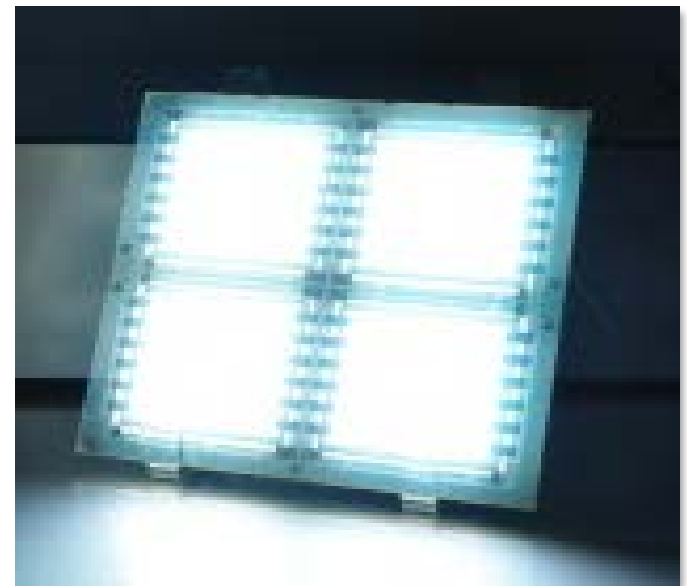


FY13 R&D Highlights

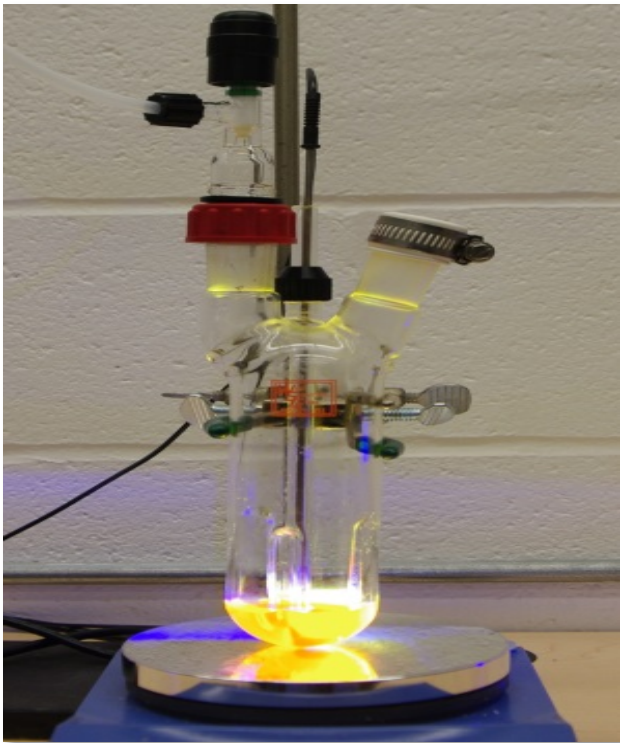


Philips Lumileds develops new chip architecture using patterned sapphire substrates

PPG develops low-cost integrated OLED substrate using inexpensive “float” glass

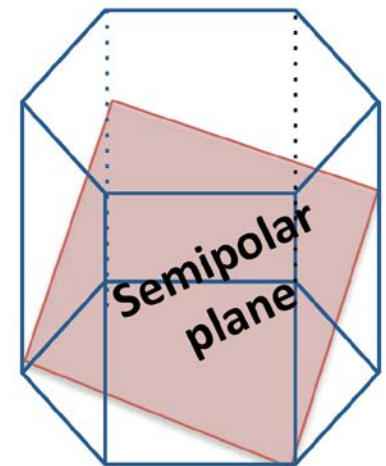
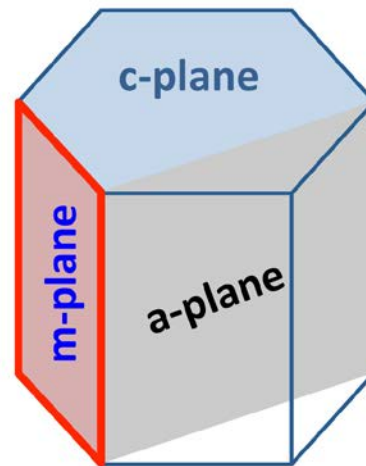


FY13 R&D Highlights



SUNY/Buffalo developing high-efficiency colloidal quantum dot phosphors

Soraa optimizes use of non-polar and semi-polar substrates



FY13 R&D Highlights



Philips Lighting Electronics introduces family of smaller, more efficient, more cost-effective LED drivers

RTI develops SSL luminaire reliability model, releases Hammer Test report



Our Challenge

- Tremendous progress to date, still much to do
- What future R&D will drive the next leaps forward?
- What R&D is needed to support value-added features?
- What efforts should be led by DOE?
By industry? By Consortia?





LED Chip Efficacy – 250 lm/W

LED Luminaire Efficacy – 200 lm/W

OLED Panel Efficacy – 190 lm/W

OLED Luminaire Efficacy – 167 lm/W

Value-Added Benefits