

Today's Presenter



Phillip Wright, Ph.D. IntertechPira Consultant and Chief Analyst and Managing Director at WRT Associates, LLC

- Dr. Wright is a highly experienced technical executive with an extensive background in semiconductor, electronic, optical, display and optoelectronic technology development leading to new products and businesses.
- WRT Associates provide technical consulting and market analysis for emerging technologies.
- Prior to founding WRT Associates, Dr. Wright managed display technology at Motorola and was Founder and Director of Process Development and Device Manufacturing of Lytel Incorporated, a start-up optoelectronics firm.
- Dr. Wright began his career at Bell Laboratories in Murray Hill, NJ and received the B.S. degree in Engineering from Purdue University, and the M.S. and Ph.D. degrees in Electrical Engineering from the University of Illinois

“The Future of OLEDs for Lighting and Displays”

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Agenda for Today's Webinar

- Announce a New Report from IntertechPira on Organic Light Emitting Diodes
 - *“The Future of OLEDs for Lighting and Displays”*
- Provide a brief look at the key markets for OLED displays and lighting
- Highlight important trends and potential accelerators for OLED market growth
- Deliver a few of the key results from the upcoming report
- Answer your questions about OLEDs
- Assess your future interest in projects like this one

Business Intelligence from IntertechPira

- IntertechPira provides market research, strategic and technical consulting to niche, emerging and high growth industries.
- Industry's we serve include photonics, biomaterials, plastic electronics, home and personal care, alternative energy, chemicals and performance materials.
- IntertechPira is a division of Pira International and was formed following the acquisition of Intertech by Pira International in 2005.
- Studies published in 2009 include:
 - The Future of Image Sensors: Market and technology forecasts to 2014
 - The Future of Flexible and Thin-Film PV: Market and technology forecasts to 2019
 - The Future of PV: Market forecasts to 2014
 - The Future of Ultracapacitors: Strategic Markets and forecasts to 2014
 - The Future of Clean Technology: Market opportunities for raw material and machinery suppliers
 - The Future of Carbon Fibers: Market forecasts and emerging apps to 2014
- For more information, contact Stephen Hill on +44 (0) 1372 802 025, stephen.hill@pira-international.com

With Respect to Technology (WRT) Associates

- Provide technical consulting and market analysis for emerging technologies
 - In Depth Domain Knowledge
 - A Thorough Approach to Analysis
 - Quick-Turn Effective Communication of Actionable Information
- Recent reports and client projects include
 - “Green” Displays
 - Realizing Energy Savings from Lower Power Televisions
 - Green Photonics: The Roles of Optoelectronics in a Sustainable Future
 - Wireless Device Applications of Optoelectronics
 - Solid State Lighting
 - Organic Light Emitting Diodes
- For more information contact Phillip Wright at +1-970-219-8800, philwright@wrtassoc.com

Report Scope

“The Future of OLEDs for Lighting and Displays”

- OLED Overview
 - Technology, Applications and Markets
- Key Drivers and Trends
 - Competing Technologies
 - Manufacturing Challenges for OLED Lighting and Displays
 - Who is Investing in OLEDs?
 - Where do OLED Displays and Lighting fit in?
 - Challenges for Commercialization
- Competitive Landscape
 - Supply Chain
 - Market Segments
 - Lighting and Display Manufacturers
- OLED Technology Forecast
 - Displays
 - Lighting
- OLED Market Forecast, 2009-2014
 - Displays – new technology in maturing market with strong LCD incumbent
 - Lighting – energy conscious market with cost effective lighting incumbents and emerging solid state lighting competition

Webinar Outline

- What are OLEDs and What difference will they make?
- Key OLED display trends
- OLED display market accelerators
- OLED lighting
 - Status of technology and market development
 - Lighting market drivers
 - Lighting value proposition

What are OLEDs?

What Difference Will They Make?

- OLEDs (Organic Lighting Emitting Diodes)
 - Displays - Sold today for mobile phones, portable media players, televisions, digital still cameras, automotive applications and more
 - Lighting - Under development today and just now reaching market for solid state lighting applications
 - Barriers to market penetration (Displays and Lighting)
 - Competition with incumbent solutions
 - Immature manufacturing infrastructure
 - High cost
 - Limited availability/supply base
 - Economic conditions have not been major barrier
 - OLEDs add product differentiation through their appearance, form factor and efficiency
 - Energy efficiency initiatives
 - Industry and governments investing strongly



Sources: Samsung, LG, Philips

Key OLED Display Trends

- OLED displays slow to take off
 - In 2009 revenue will exceed \$1 billion
- Primary revenue driver for OLED displays is mobile phones
 - AMOLED displays for high end & “smart” mobile phones
 - Mobile phone share of OLED display revenue will exceed \$750 million in 2009 and grow to nearly \$2 billion 2014
- AMOLED television excitement but limited revenues so far
 - Only one AMOLED television (Sony 11” XEL-1) has been launched
 - Our roadmap calls for AMOLED televisions to continue to be introduced during the forecast period (11” 2007, 15” 2009, 27” 2010, 40” 2012)
 - Forecast that AMOLED television revenue will exceed \$1 billion in 2014
- Competition with LCDs will limit OLED penetration
- What will accelerate OLED display acceptance?

OLED Display Market Accelerators



SONY



- **Samsung** rolls out 10 high end phones with AMOLED displays in 1H09
- Will **Apple** iPhone/Touch follow suit?
- What are the prospects for AMOLED TV? –
 - **Sony** has pushed back introduction of larger set to 2010 (or later?)
 - **Samsung** 40” set prototype shown but no shipping date
- **LG** announces they will launch 15” AMOLED TV in late 2009
- **Nokia** works steadily to develop suppliers of AMOLED displays and ships phones with more appealing displays and longer battery life
- **Samsung** says will introduce a notebook computer with AMOLED display in 2010

OLED Lighting Development Status and Prospects

- OLED lighting is under intense development worldwide
 - Not yet shipping in significant volumes
 - Lighting efficacy, color temperature, lifetime, manufacturing all showing improvement
- Philips and Osram have begun to ship OLED lamps in developer kits and sample quantities
- Rapid market growth is set to begin
 - Forecast OLED lighting revenue will exceed \$1 billion in 2013 growing to nearly \$2 billion in 2014
- Key questions:
 - When will OLED lamp mass production start?
 - What OLED materials and manufacturing approaches will deliver cost effective lighting?
 - How will OLED lamp prices evolve?
 - How will lighting designers adopt OLED lighting for general and specialty illumination markets?
 - Where will OLED lighting fit in the evolving market for efficient lighting?

OLED Lighting Market Drivers

- Who is investing and why?
 - Governments – US, EU, Asia
 - Known lighting industry players and more
 - Philips, Osram, GE, Konica Minolta, Lumiotec
 - Supply chain participants
 - Materials, devices, and IP
 - Kodak, Universal Display, CDT, ...
 - Equipment suppliers
 - Applied Materials, Aixtron, Sunic, ...
- Other entrants?
 - Samsung, PMOLED manufacturers, ...

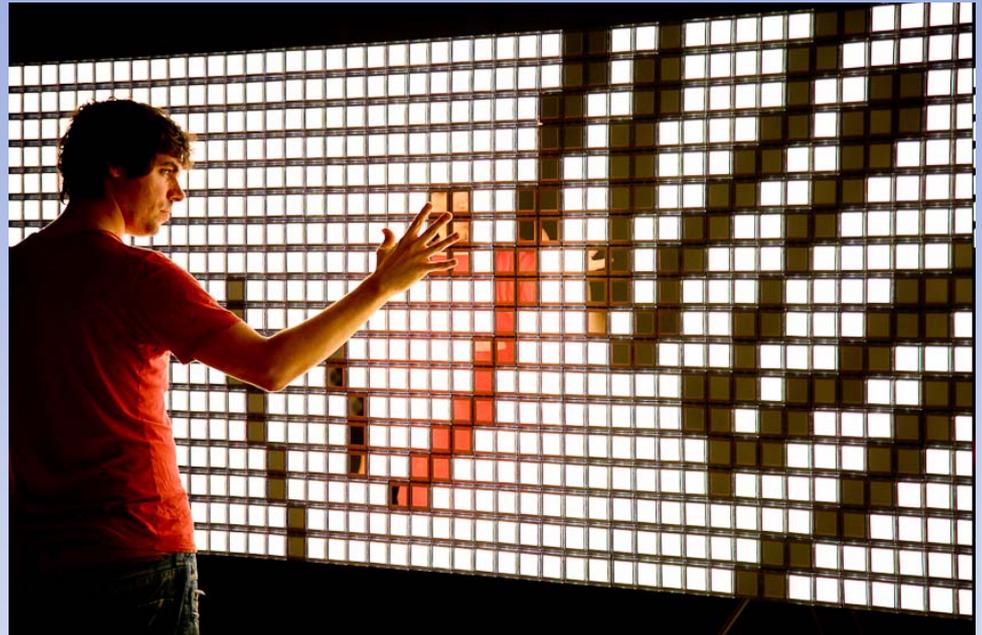
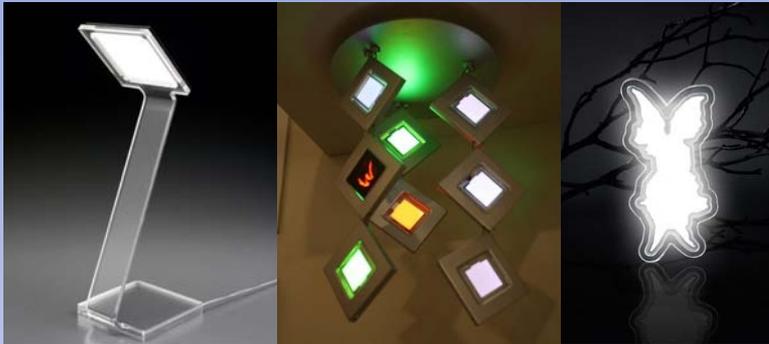
PHILIPS



Kodak



What Will OLED Lighting Deliver?



Sources: Toshiyuki Kita, WAC Lighting, Philips, NEC, Research Institute for Organic Electronics

OLED Lighting Value Proposition

- What will OLED lighting deliver?
 - Energy savings
 - New design freedom – thin and flexible
 - New lighting solutions – windows, mirrors, walls, displays
- Where will it be applied?
 - General illumination, Display backlighting, Signage, Automotive, Decorative, Accent, Architectural, Others?
- Forecast that OLED lighting revenue will exceed \$1 billion in 2013 and grow to nearly \$2 billion in 2014

Webinar Summary

- OLED displays will reach \$1 billion in sales in 2009 driven by mobile phone applications
- AMOLED display revenue will grow rapidly from 2009-2014 (CAGR 35%) led first by mobile phones and then televisions later in the forecast period
- OLED lighting is poised to come to market in 2010 and revenue will exceed \$1 billion in 2013
- Both OLED displays and lighting will need major investment in manufacturing infrastructure to achieve and maintain revenue growth
- OLEDs will face competition from entrenched LCDs and fluorescent lighting and emerging solid state lighting products

Upcoming Report

- Announcing a New Report from IntertechPira on Organic Light Emitting Diodes
 - *“The Future of OLEDs for Lighting and Displays”*
 - Available Date Q4 2009 Price: £3,500 - early bird, pre-publication discount available - for details contact:
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Questions and Answers



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