OLED Displays

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Overview

- Technology - wazzup!
- The Edge Ahead – Application Areas
- Timeline – "Event Horizon"
- Proprietary© Technology™
- Hot Stuff – Eye Candies
- Questions?!

Technology

- **Organic** Light Emitting Diodes
- Light emittation based on fluorescence
- Carbon-based designer molecules
  - Polythiophene
  - Polyfluorene
  - Polyphenylenevinylene

Getting them to glow...

- Polymer layer sandwitched between two electrodes
  - Thinner than 500 nm
- Electrons in benzene rings are excited by an external voltage of 3 to 5 V.
- Upon returning to ground state, they radiate a soft bright light
- Leave no trace of afterglow
- Illuminating power is comparable to a conventional 100 W light bulb.

Matrix

- Passive
  - Individual pixels get activated passively
  - Illumination to row and column line
    - Brightness determined by amount of current flowing
  - Technically difficult to activate more than one million pixels (size of 8 inch display)
- Active
  - Every light spot gets its own thin film transistor (TFT)
  - Additional layer of polycrystalline silicon
    - Improving life spot's life span

Manufacturing Process

- Cheap and simple
  - Production process similar to an Ink Jet printer
  - **BUT:** Production rooms need to be air-tight
  - Latest: Organic Vapor Phase Deposition (OVPD) by UDC
- Displays require hermetic sealing
- In use was thin class
- Now: flexible plastics
  - Whole new application possibilities

The Edge Ahead

- OLED's have a simpler structure
- Polymers form solid cover
- No more complex reorientation of light
- Much brighter
- Nearly 180° viewing angle with 90% surface covered
- Refresh rate (great for video)
- Not adversely affecting energy balance

Application

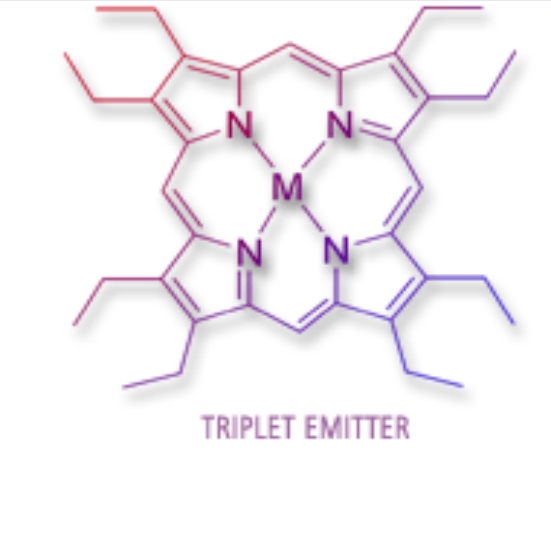
- Flexible plastics enable rollable displays
- Woven into clothing
- Walls and ceilings painted with OLED's
- No other technology can produce such thin and versatile light sources.

Timeline

- 1985: First discovery by Ching Tang
- 2005: Glass flat-panels will land
- 2005 – 2008: Transition to plastic displays
- 2009: Volume shipments of notebook displays
- 2012: Market expected to reach $3 billion.

High Efficiency Materials

- Electrophosphorescence by United Display Corporation
- Use of both singlet and triplet excited state
- Potential of 100% efficiency



Proprietary UDC Technology

- TOLED's [@ www.universaldisplay.com/toled.php]
  - Emitting
    - Top-only
    - Bottom-only emitting
    - Both (transparent)
  - Improves daylight readibility

Proprietary UDC Technology

- SOLED's [@ www.universaldisplay.com/soled.php]
  - Stacking of red, green and blue subpixels
  - Improving display resolution
  - Enhances full-colour quality
  - Only a third of space required
    - Useful for wireless web-applications

Major Players

- Kodak just branded its OLEDs NuVue Display Technology
- DuPont recently launched Olight brand
- Siemens expert on surface efficiency
- All other major players are licensees of Kodak or Cambridge Display Technology

Hot Stuff

- Sony 10-inch notebook diplay

Hot Stuff

- Electronic Newspaper by IBM
- Kodak EasyShare
- Other:
  - Mobile phones
  - Digital cameras

OLED's

Thank you.

Your questions, please.