Wide Color Gamut Displays Are Here. What’s Next?

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Trends in Smart Phone Display Performance

% Human Acuity

- Color Gamut
- rec.709 Gamut
- Resolution

2009 2010 2011 2012 2013
New Phosphor Material – Quantum Dots

- Semiconductor nanococrystals
  - 1-10nm in diameter
- Core/shell structure
- Emission wavelength determined by crystal size
- Narrow FWHM: 30-40nm
- High QY: ~90%
- Long-term stability
Quantum Dot Enhancement Film – QDEF

No retooling needed for LCD integration:
QDEF replaces bottom diffuser
Blue LED replaces white LED
QDEF replaces bottom diffuser
Backlight with QDEF

White LED

Blue LED + QDEF
100% Adobe-RGB Coverage with QDEF
Roll-to-Roll Process for QDEF

- Roll-to-roll processing
- 3M-Nanosys partnership formed to manufacture QDEF
- Dependable, flexible supply of QDEF established
Over-the-Air Broadcast

Application/User/Device Specific Content Delivery
Co-Existence of Different Color Standards

- **sRGB**
  - current internet color standard, HDTV
- **Adobe-RGB**
  - Professional printing, professional photography
- **DCI-P3**
  - Digital cinema
- **Can the same display support all 3 standards?**
QDEF Color Gamut with Current CF72 Color Filters

- With current CF72 color filters, LCD with QDEF offers good coverage of the 3 color standards: sRGB, Adobe-RGB, DCI-P3
QDEF Color Gamut with Improved CF72 Color Filters
Removing Blue Leakage

- If blue leakage into green and red color filters can be suppressed, complete coverage of sRGB, Adobe-RGB, and DCI-P3 is possible with QDEF.
Summary

- LCDs using Quantum Dot Enhancement Film (QDEF™) offer high efficiency and low cost solution for high color gamut displays.

- QDEF provides display solution that is compatible with different color standards:
  - sRGB
  - Adobe-RGB
  - DCI-P3

  and therefore offers stunning visual experience while maintaining color accuracy.
Thank You!