

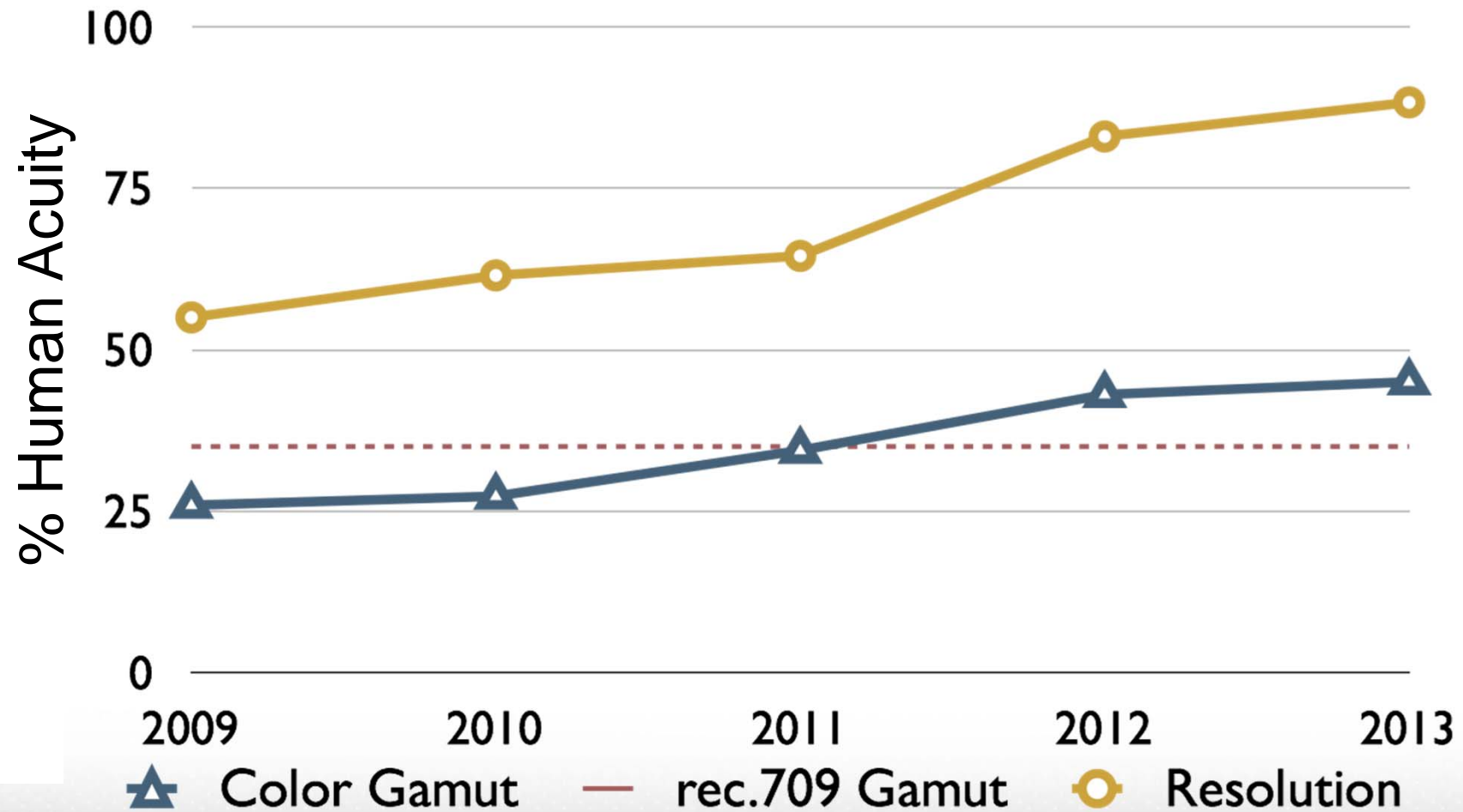


Wide Color Gamut Displays Are Here. What's Next?

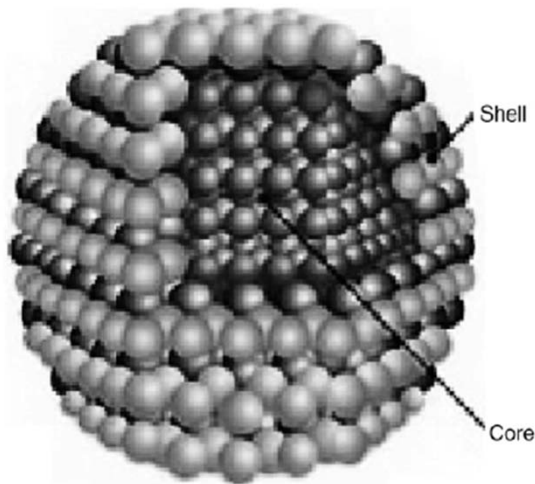
Jian Chen, Nanosys, Inc., Milpitas, CA



Trends in Smart Phone Display Performance

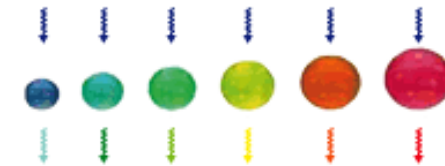


New Phosphor Material – Quantum Dots

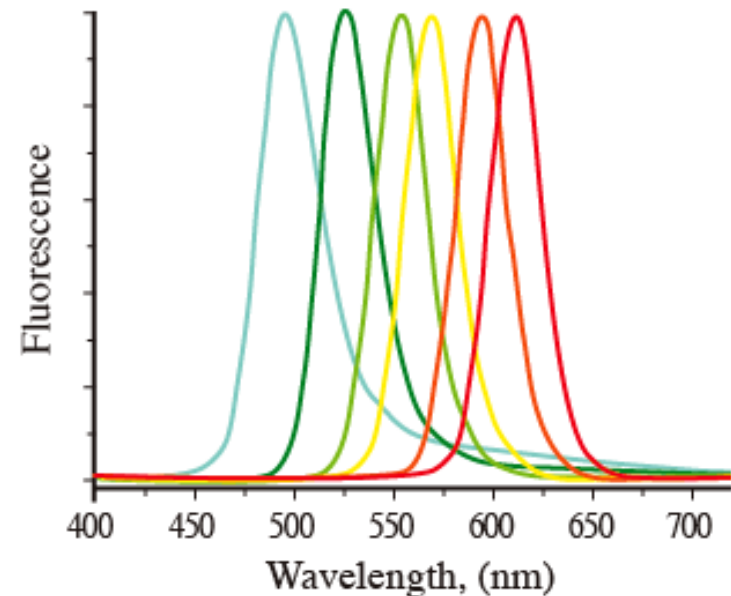


- Semiconductor nanocrystals
 - 1-10nm in diameter
- Core/shell structure
- Emission wavelength determined by crystal size
- Narrow FWHM: 30-40nm
- High QY: ~90%
- Long-term stability

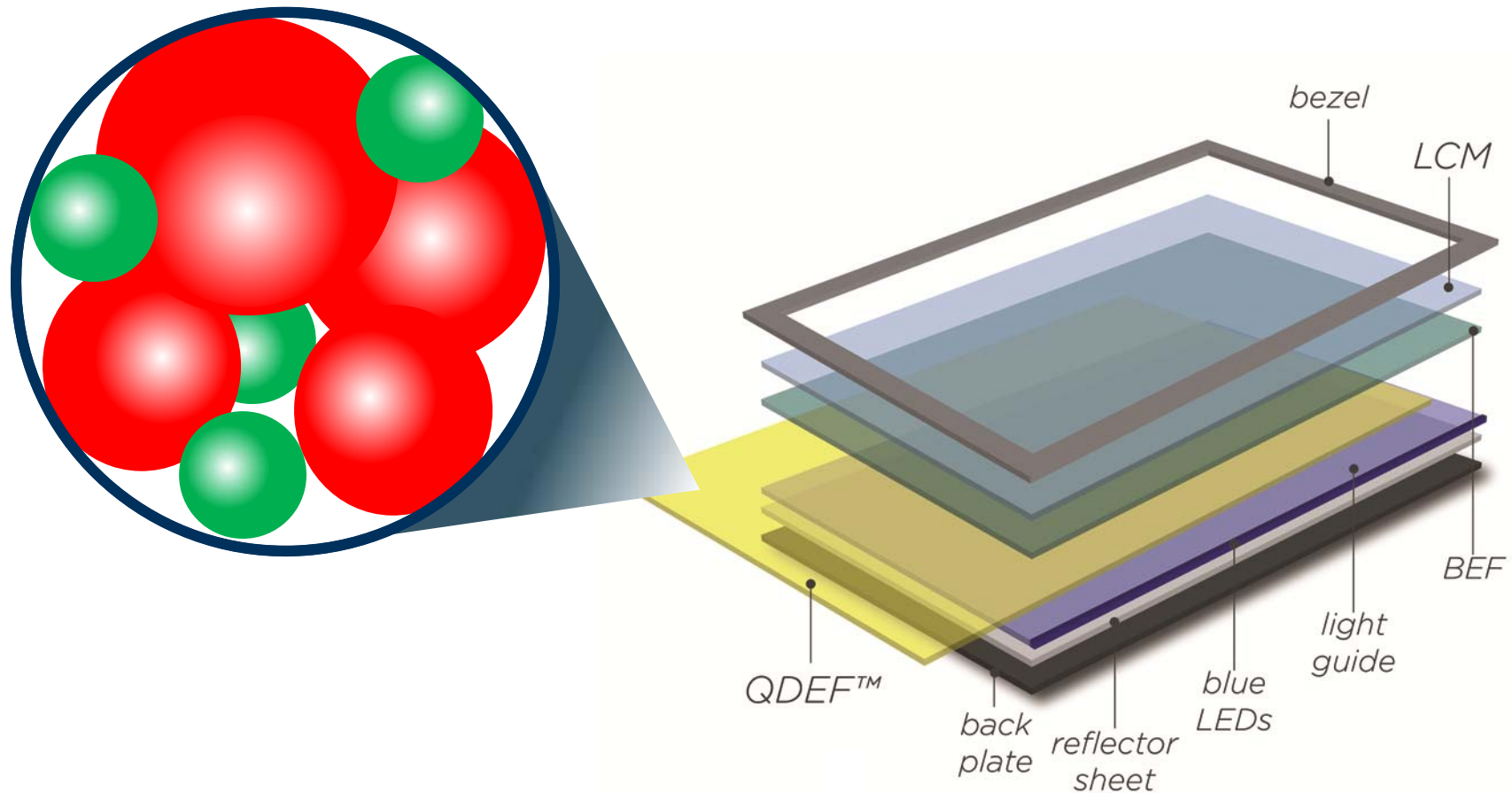
Simultaneous excitation at 365 nm



Size-dependent emission

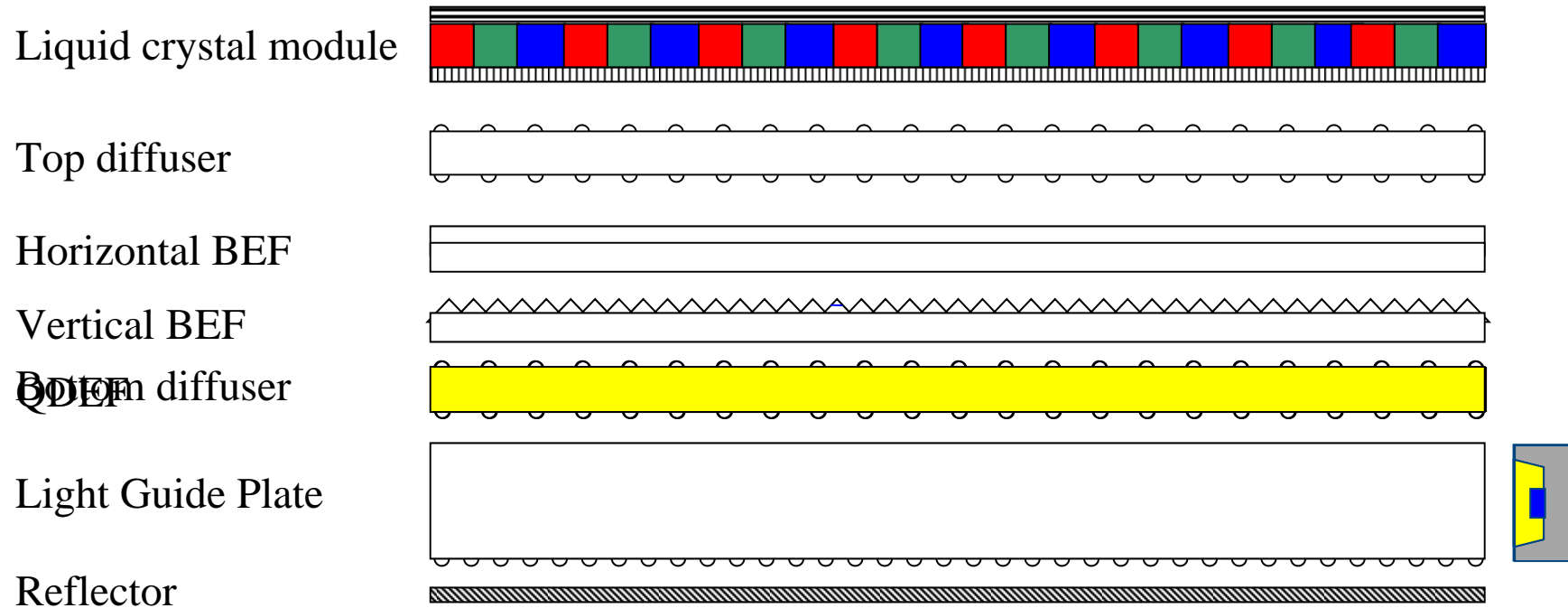


Quantum Dot Enhancement Film – QDEF



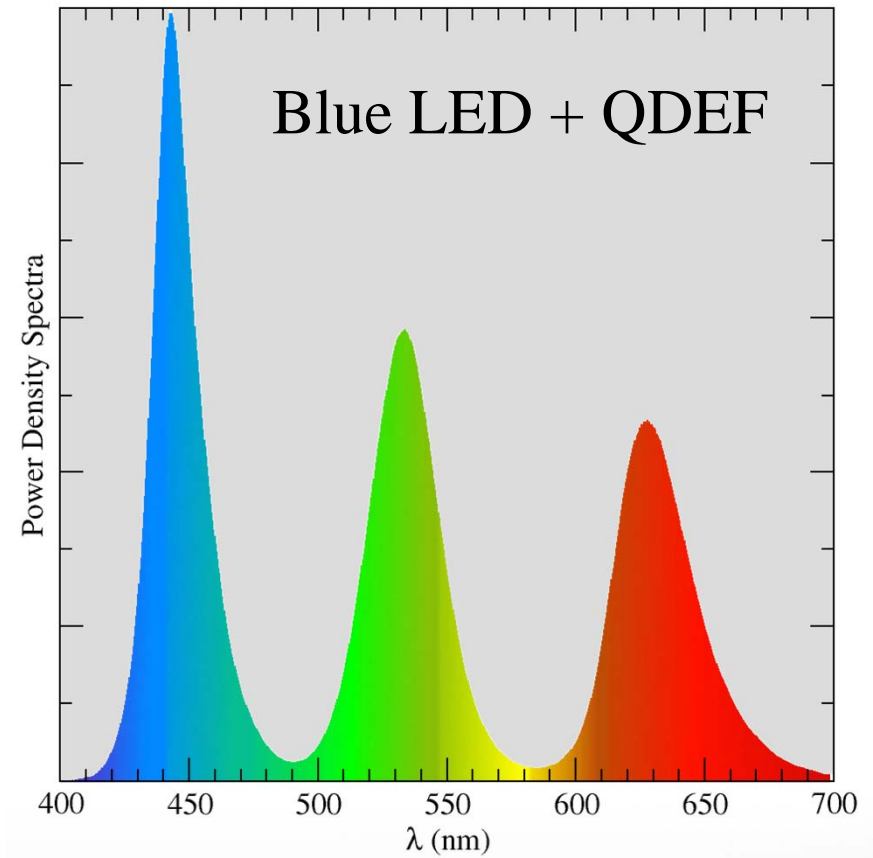
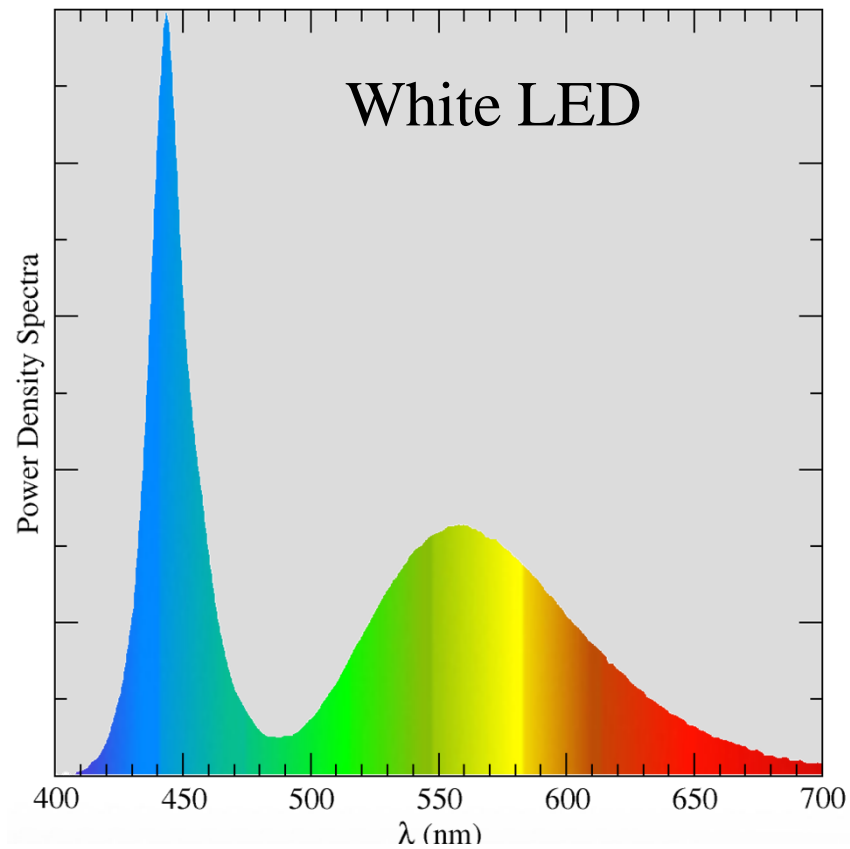
No retooling needed for LCD integration:
QDEF replaces bottom diffuser

Backlight Unit with QDEF

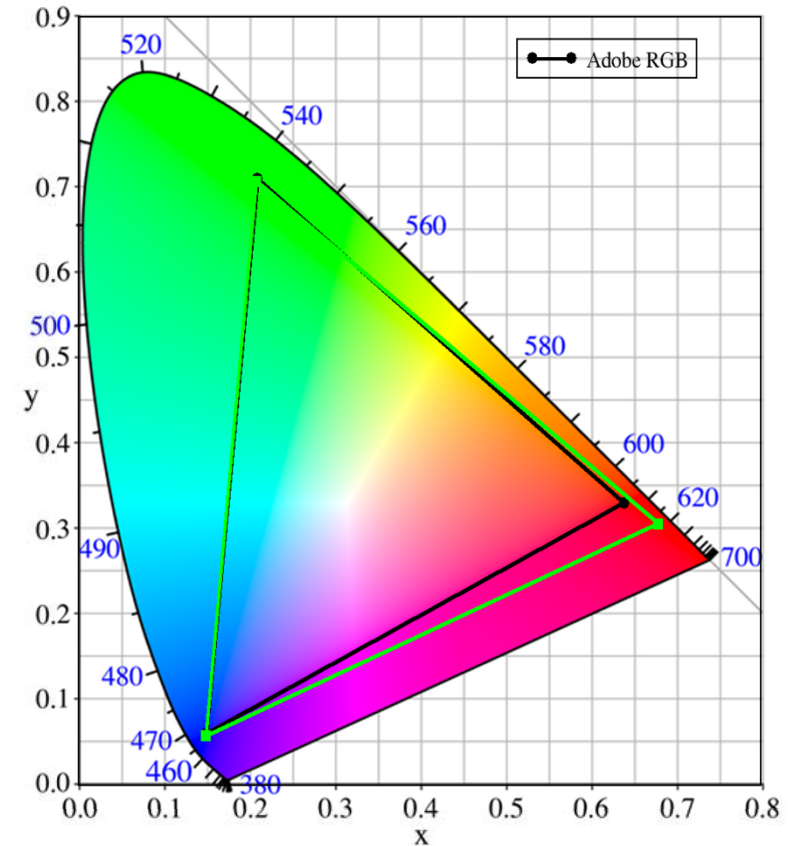
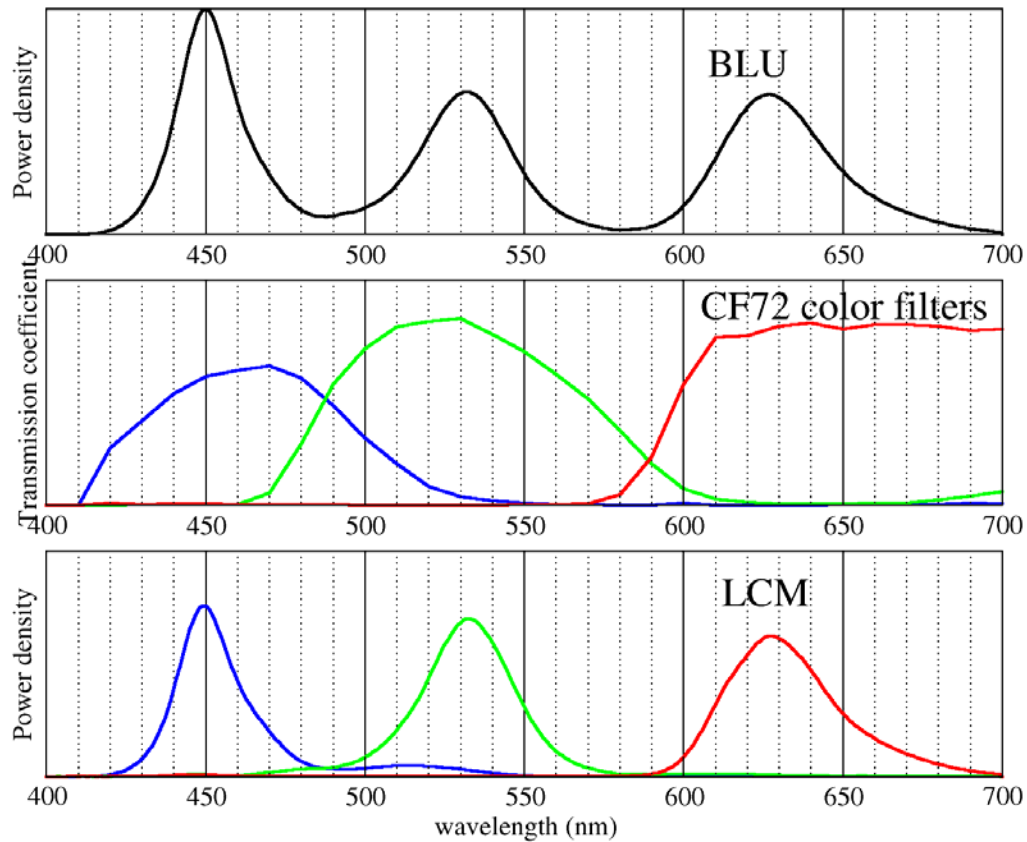


- Blue LED replaces white LED
- QDEF replaces bottom diffuser

Backlight with QDEF



100% Adobe-RGB Coverage with QDEF



Roll-to-Roll Process for QDEF



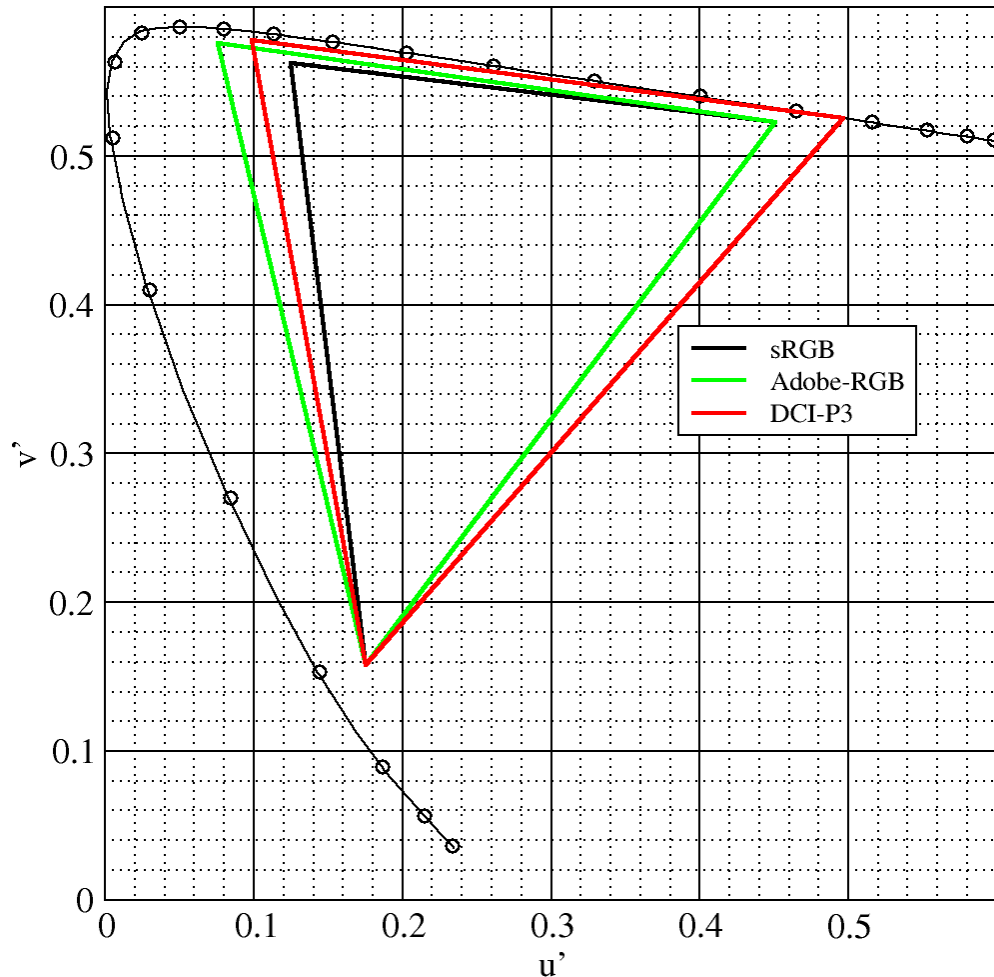
- Roll-to-roll processing
- 3M-Nanosys partnership formed to manufacture QDEF
- Dependable, flexible supply of QDEF established

Over-the-Air Broadcast

→ Application/User/Device Specific Content Delivery



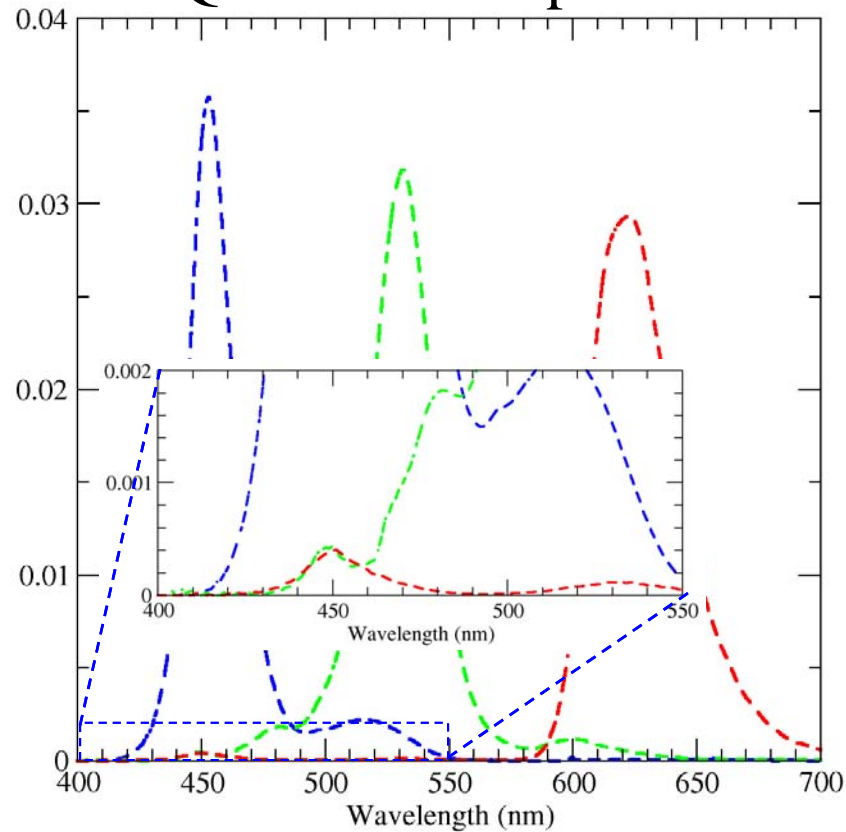
Co-Existence of Different Color Standards



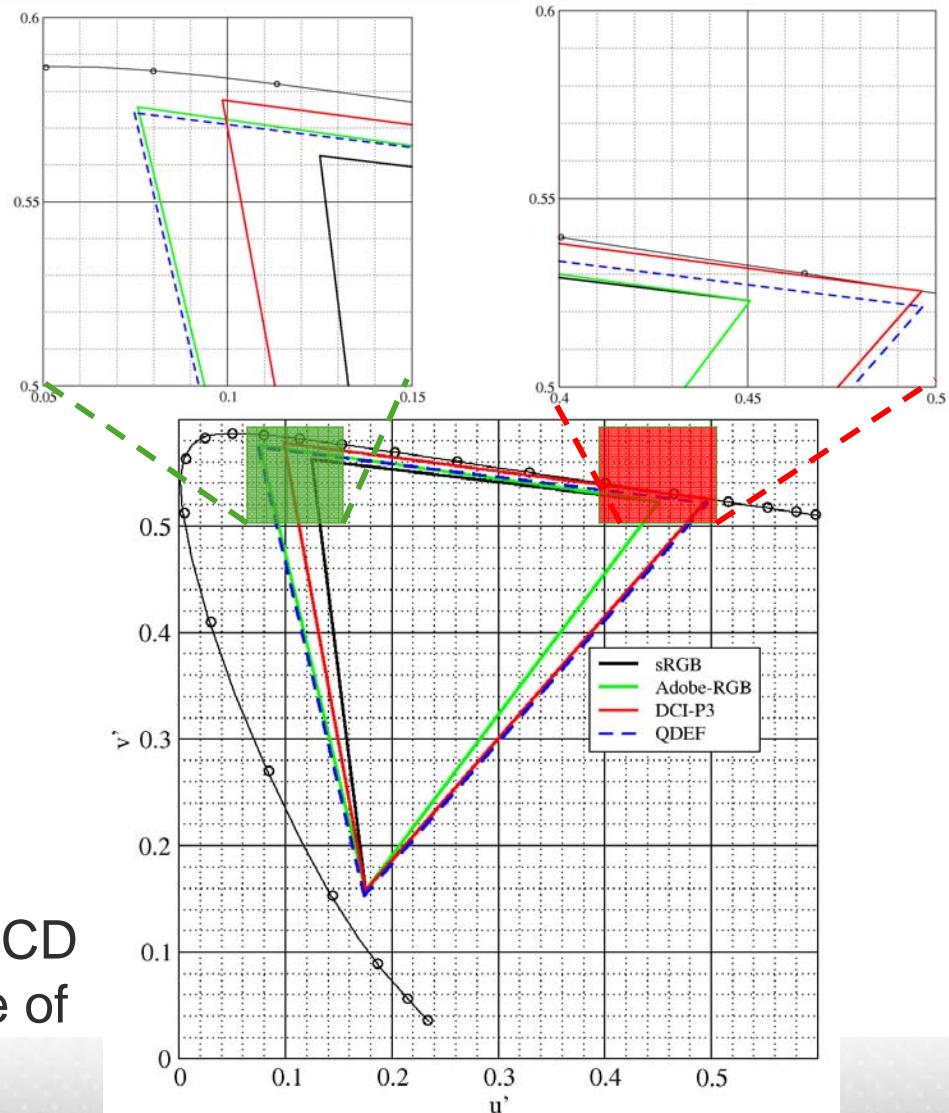
- **sRGB**
 - current internet color standard, HDTV
- **Adobe-RGB**
 - Professional printing, professional photography
- **DCI-P3**
 - Digital cinema
- Can the same display support all 3 standards?

QDEF Color Gamut with Current CF72 Color Filters

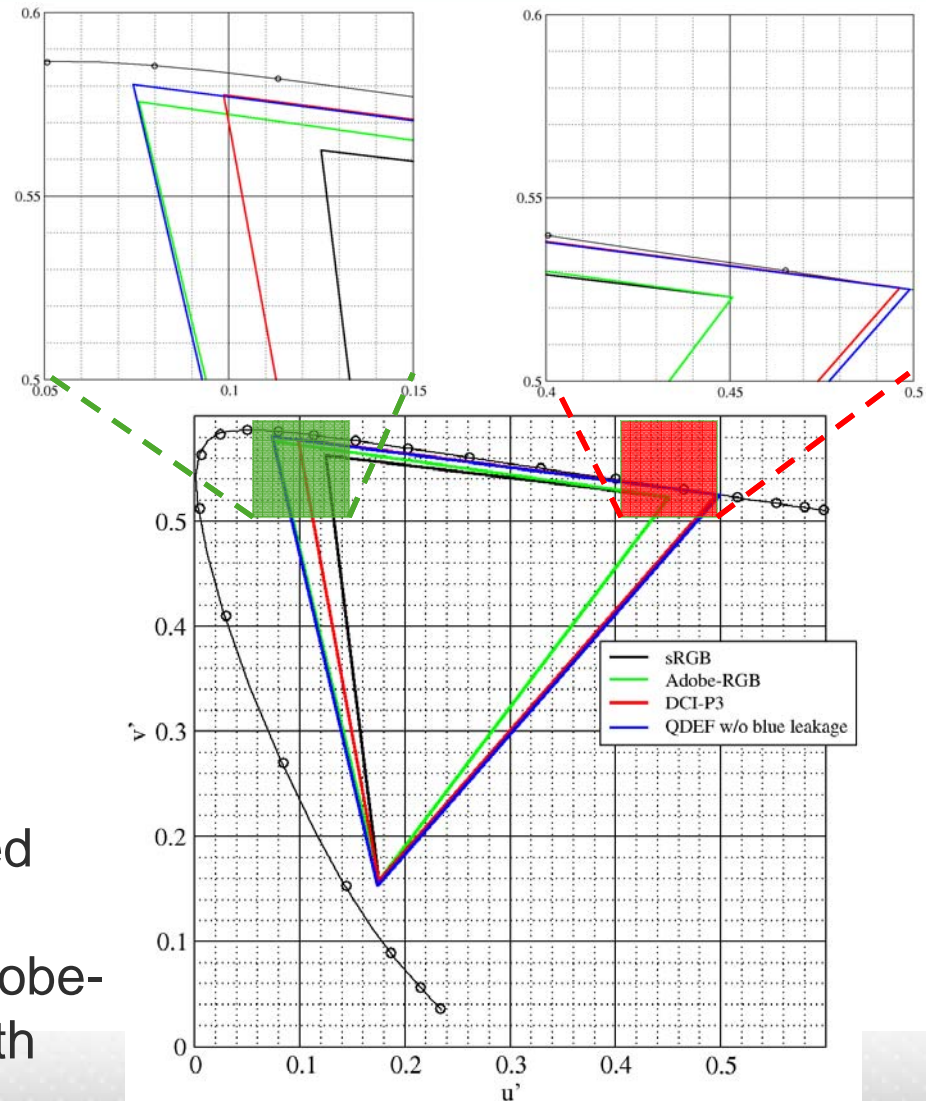
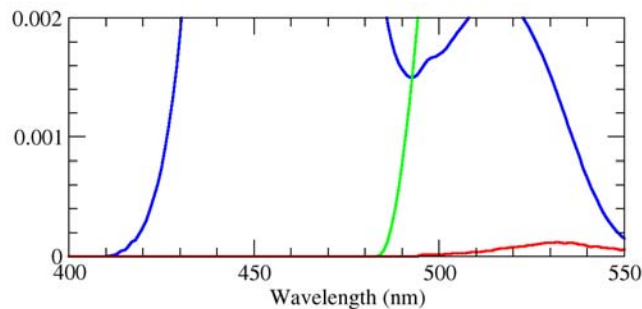
QDEF LCM Spectra



- 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-P3and therefore offers stunning visual experience while maintaining color accuracy

Thank You!