



*Development of Nanosys Quantum
Dot Technology*

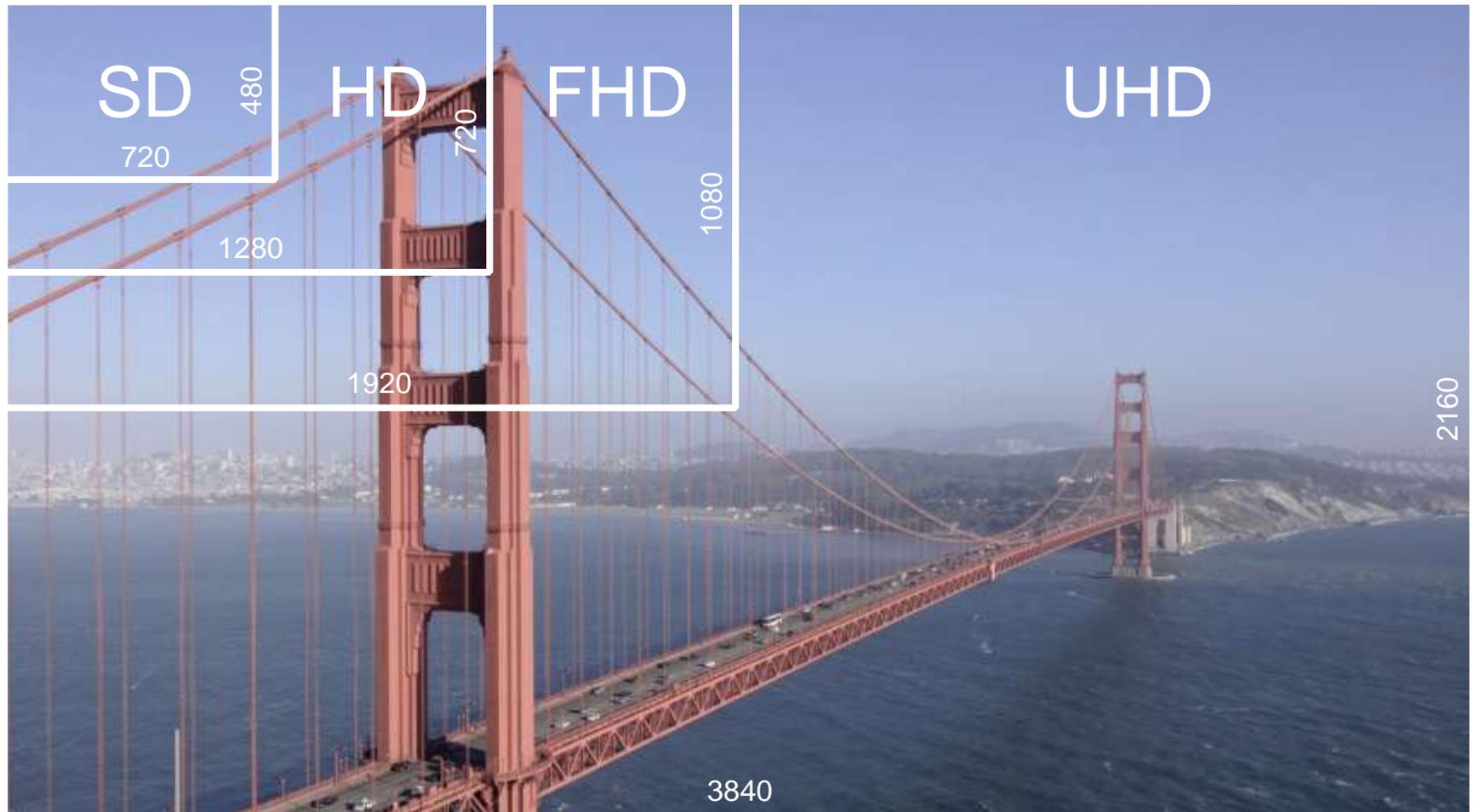
Charlie Hotz, Vice President R&D

About Nanosys

- Founded in 2001 in Silicon Valley, CA Nanosys was the first company to focus on Quantum Dots for electronics
- Significant revenue, cash & profitability growth in 2014
- Broad, deep and litigation-tested IP portfolio to sustain long term differentiation with 223 worldwide patents granted & 90 pending
- Nanosys operates a 60,000 sq ft state-of-the-art nano-material fab with installed capacity to service more than 6 million 60" class TVs
- ~100 employees

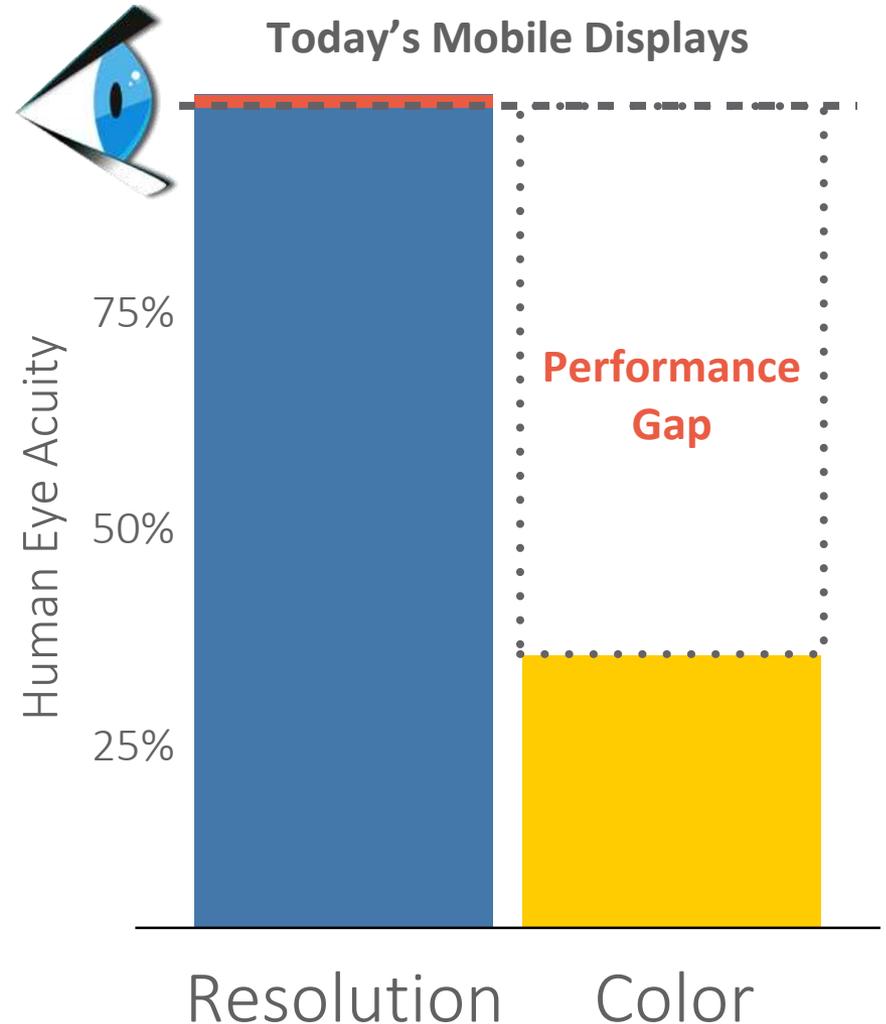


For the past 5 years you've heard that adding **more pixels** matters most

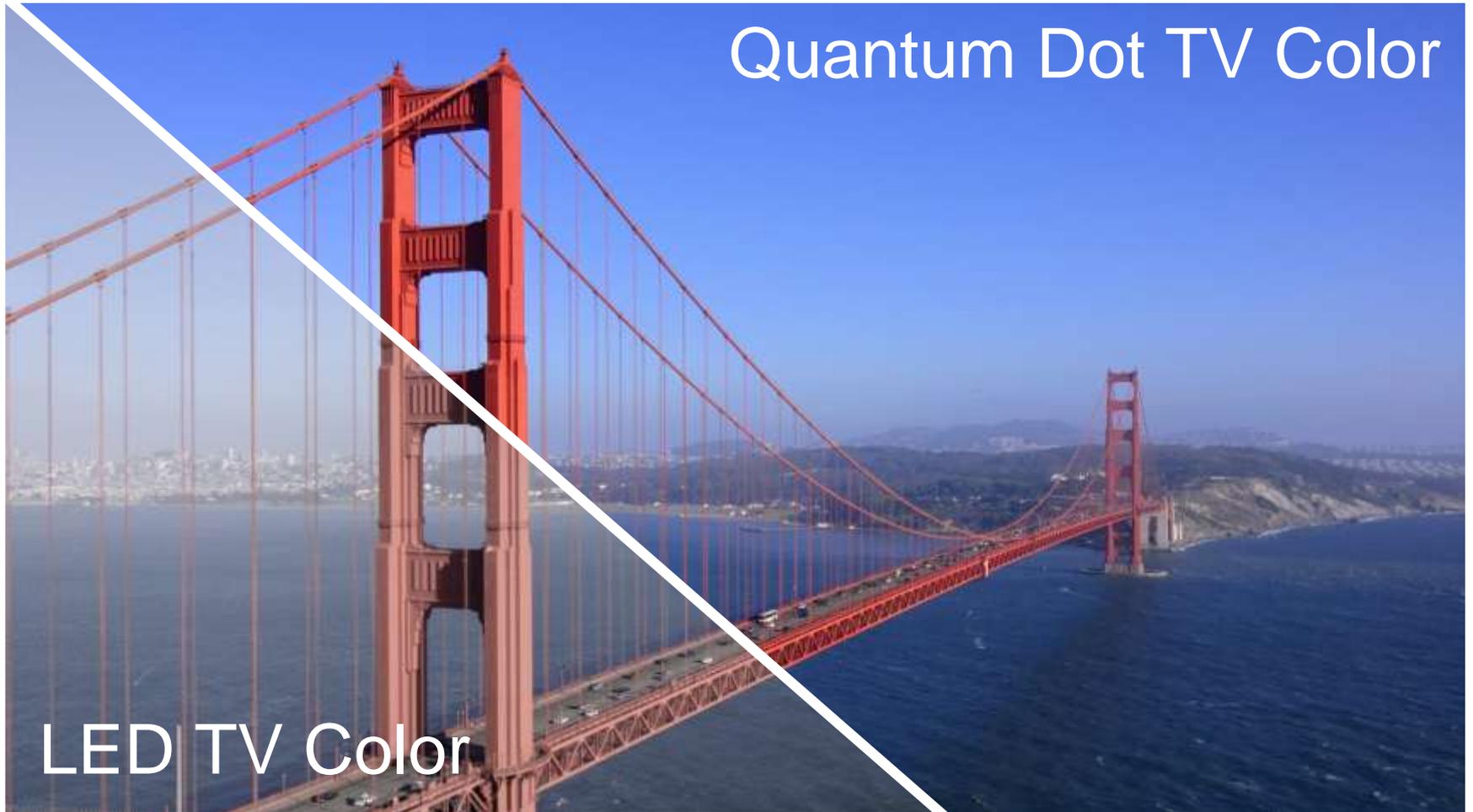


Problem: Resolution is great but color and dynamic range are missing

- Today's displays only show about 1/3 of the range of color our eyes can see
- Better pixels with lifelike color and higher brightness deliver more “wow” than just more pixels alone
- Today's LED and OLED technologies fall short on color spectrum and brightness



Better, smarter pixels offer more user experience value



Quantum Dot TV Color

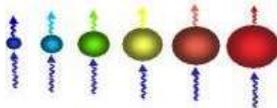
LED TV Color

Broad and Deep Litigation-Tested IP Portfolio



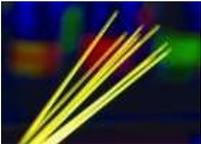
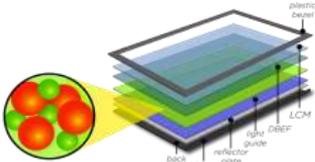
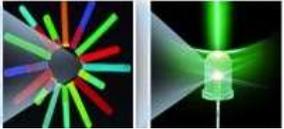
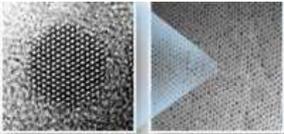
- Founded in 2001 with pool of 65 seminal Quantum Dot patents exclusively licensed from the world's leading research institutions including 40-50 from LBNL
- Nanosys continues to innovate and develop new technologies
 - Over 300 patent and patent applications related to core shell Quantum Dots and QDEF®
 - These patents and patent applications cover core shell quantum dot device applications, devices, surface chemistry and processing technologies

Comprehensive IP Portfolio



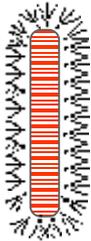
Processing techniques

- Core-shell nanocrystal growth and coating methods
- Control of size, shape, and composition
- Ligand and matrix material synthesis
- Hermetic sealing and packaging
- Device component manufacturing



Quantum Dot Device Applications

- Emphasis on LCD backlights, displays, notebook computers, TVs, and mobile devices



Surface Chemistry

- Surface control
- Dispersion technology
- Coating technology
- Functionalization

Key Materials

- Core-shell Quantum Dots
- Quantum dots of uniform size
- Quantum dot composites
- Important compositions
- Encapsulated QD materials

Quantum Dot Devices

- White light emitting devices
- Color conversion devices
- Specific device architectures
- LED Filters
- Electrical and optically pumped devices

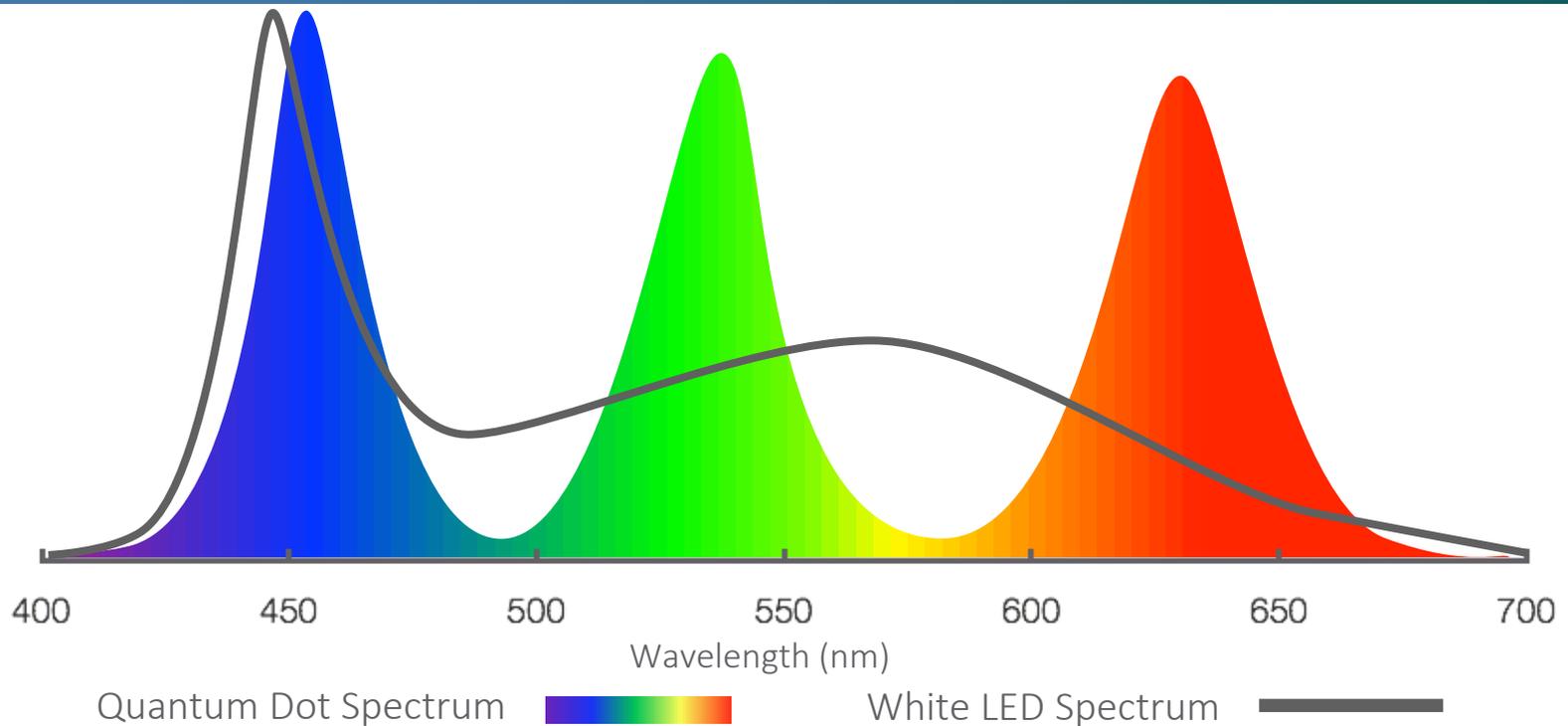
>220 Patents Granted & >75 Pending

Quantum Dots: Key Facts



- The world's most efficient light emitting technology
- Nanoscale material, just atoms in diameter, with unique spectral properties that make it perfectly suited for displays
- Shipping in high volume today with robust supply chain partnerships for end products ranging from mobile to TV

Quantum Dots Offer True Red, Green & Blue



- Wavelength is fully tunable via size of quantum dots, intensity is fully tunable via concentration
- Greater color depth and accuracy– below 30nm FWHM for both red and green
- High quantum efficiency– 95%

Nanosys: the premier developer and manufacturer of Quantum Dots

Your TV at home

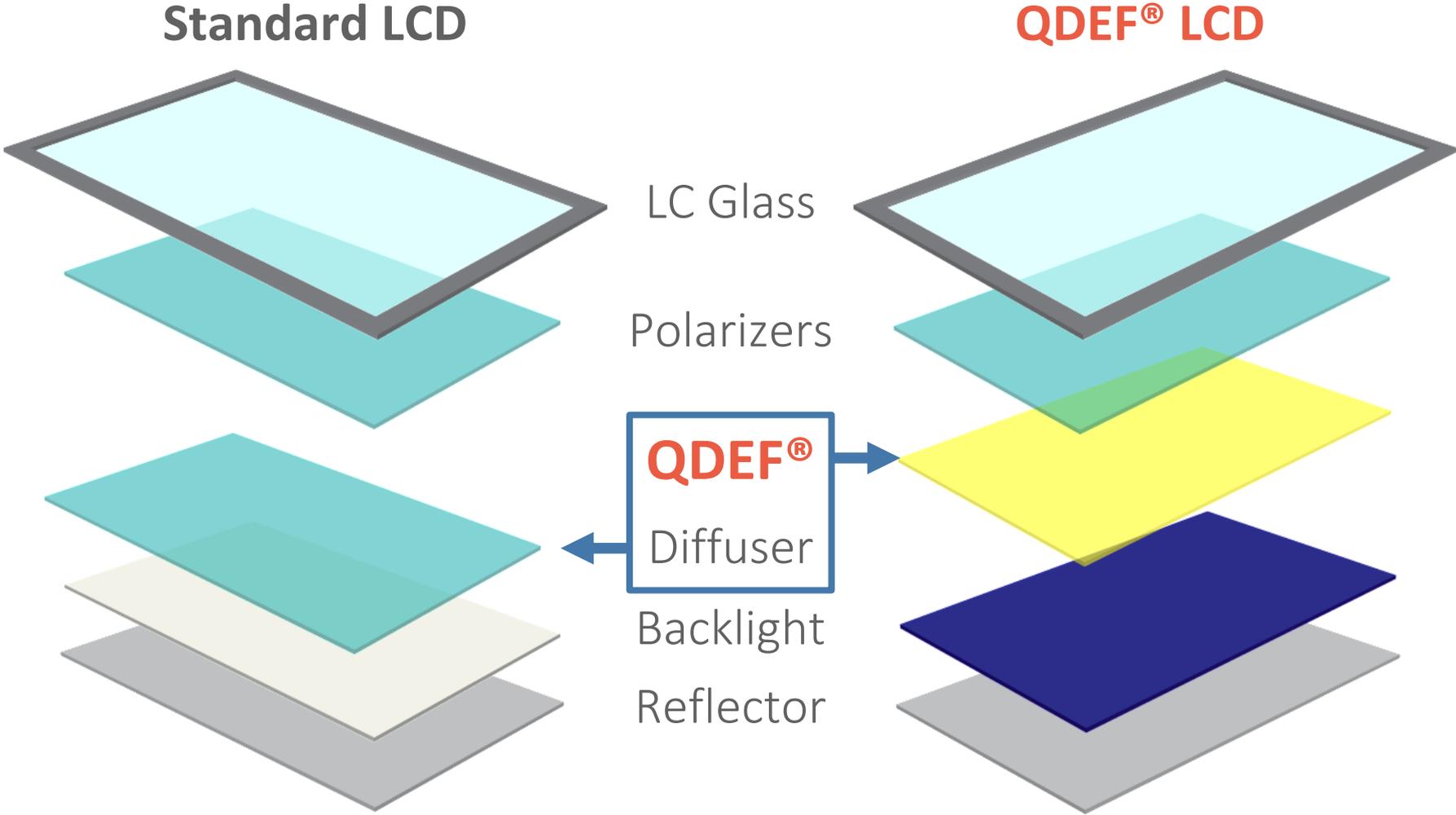


TV with Nanosys QDEF



- Key enabling technology for next generation displays
- Quantum Dots deliver stunning image quality with lifelike color and dynamic range while consuming less power

QDEF[®] designed to be cost neutral with simple “drop-in” manufacturing process

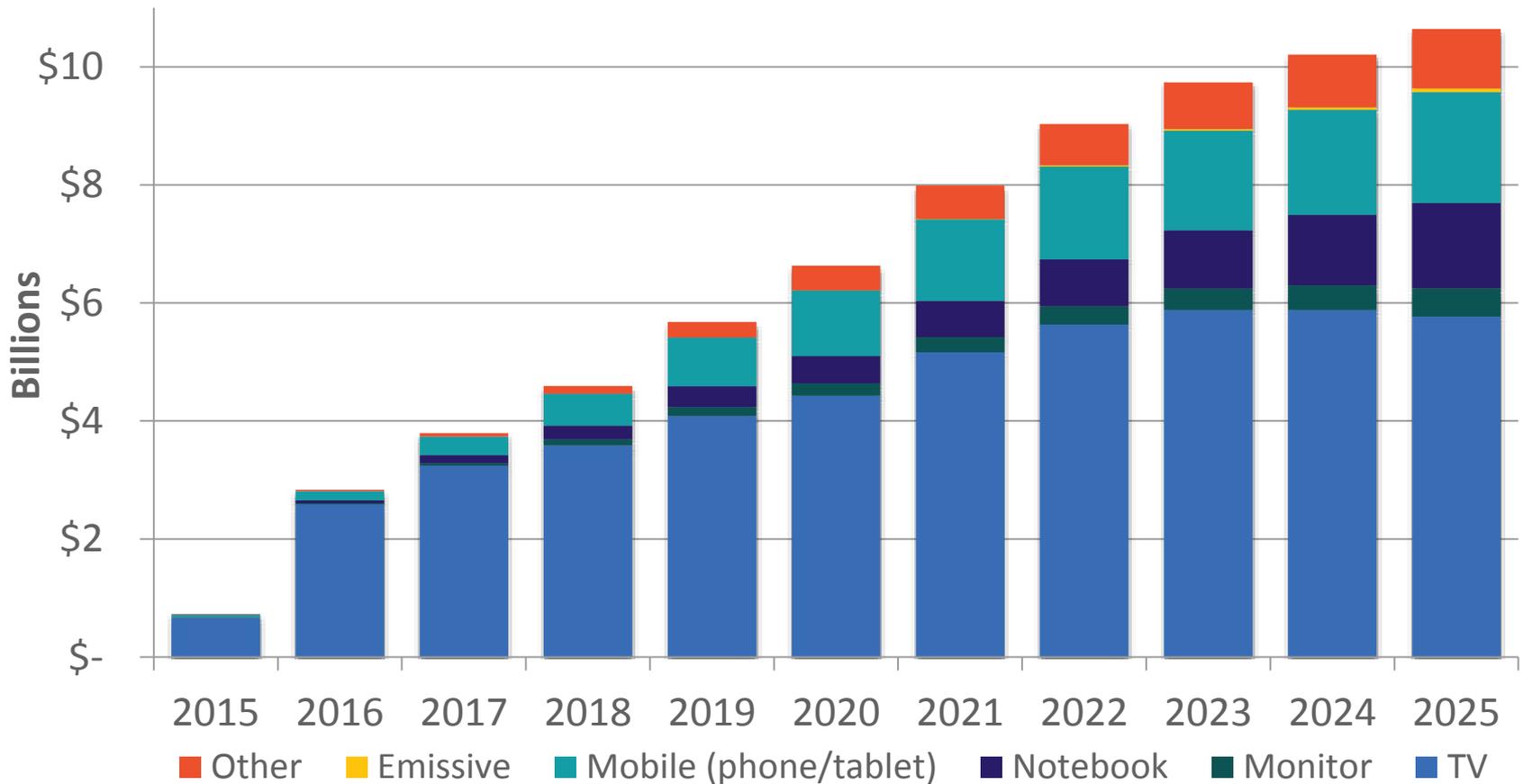


Nanosys QD Market Penetration



Market Growth

Quantum Dot Components to reach \$10.6B by 2025



Summary

- Control of intellectual property is a critical success factor for emerging technology companies.
- All of the Berkeley-licensed quantum dot fundamental science has been carried out under the auspices of LBNL.
- My colleagues at Nanosys could not have succeeded in this commercialization effort without the phenomenal support of the Berkeley Lab community and tools.

Thank You



For more information:

nanosysinc.com

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