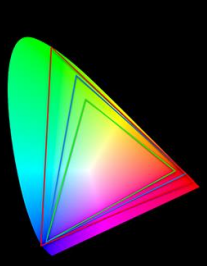
Quantum SOLUTIONS

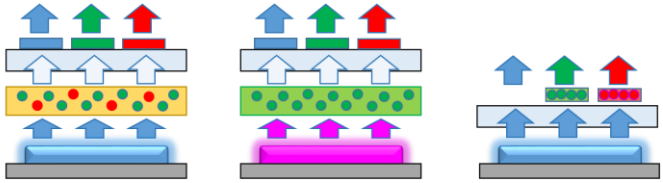
Perovskite Quantum Dots for LCD Displays



Quantum dots extend the color gamut of LCD displays, making them present more vibrant colors with better contrast in TVs, laptops and tablets. This is an ideal solution for HDR displays to meet Rec2020 standard. On top of that, QDs help to reduce the energy consumption. Nowadays, many TV makers adopted this technology. QUANTUM SOLUTIONS offers novel green Perovskite QDs for LCD application ("LCD backlighting" and "LCD color filters"). These materials have high photoluminescence efficiency (up to 100 %), narrow band emission (< 20-25 nm). This makes them a better quality and more environmentally friendly alternative to the current CdSe and InP QDs.

BENEFITS:

- Emission for Rec2020 and beyond: 510-530 nm
- The narrowest FWHM among all QDs (< 20-25 nm)
- High PLQY up to 100 %
- High absorption coefficient of the blue light
- RoHS compliant for LCD backlighting, cadmium free
- High reliability (RA) to thermal and photo exposure



LCD backlighting with blue light source and green+red QDs layer

LCD backlighting with magenta light source and green QDs layer

LCD green+red color filters with blue light source

PERFORMANCE for LCD backlighting:

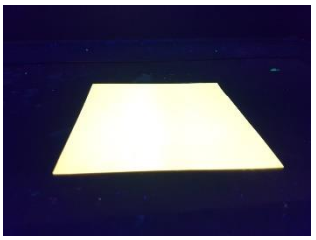
LUMAR™ $CsPbBr_3$ QDs in a polymer film: polymer type – IBOA, QDs content - 0.5 wt %, film thickness - 100µm	
Emission	510 – 530 nm (tunable)
FHWM	< 20-25 nm
PLQY	> 60-70 %
RA@85 ^{0}C, blue light 10 mW/cm^2	1,000 hours (70-80 % of initial PL)
RA@60 ^{0}C, blue light 10 mW/cm^2, 90 % relative humidity	1,000 hours (80 % of initial PL)
PL quenching at 100 ^{o}C	65-70 % of initial PL (reversible)

Products portfolio:

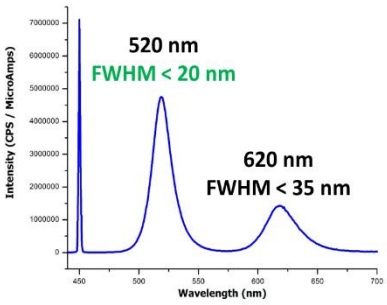
- **LUMAR™ $CsPbBr_3$ Quantum Dots**

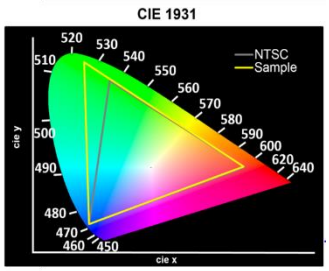
Perovskite QDs $CsPbBr_3$, 510-530 nm emission peaks, high thermal and photo stability for LCD

EXPERIMENTAL DATA for LUMAR™ $CsPbBr_3$ QDs in a polymer film:



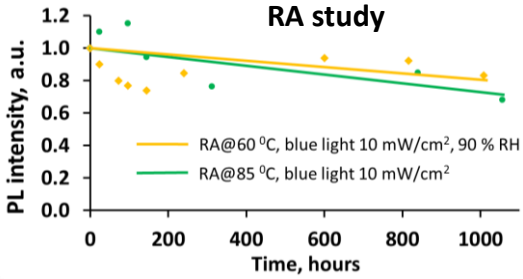
LUMAR™ $CsPbBr_3$ QDs can be used as a green emissive material in combination with red QDs (CdSe or InP QDs based) for LCD backlighting.





120 % of NTSC area

Due to narrow FWHM of emission, LUMAR™ $CsPbBr_3$ QDs makes LCD to exceed NTSC standards and get it closer to Rec.2020. Our special QDs shelling enables to achieve high thermostability and photodegradation resistivity according to industrial standards to QDs.



RELATED LITERATURE (with our contribution):

1. Lutfan Sinatra et al. **SID Symposium Digest 2018**, 1681-4
2. Jun Pan et al. **SID Symposium Digest 2017**, 83-86.

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