

LUMAR™ CsPbBr₃ QDs

Technical Data Sheet

LUMAR™ CsPbBr₃ QDs are specifically developed to meet the requirements of LCD display industry (“LCD backlighting” and “LCD color filters”) of high optical properties alongside with high thermostability and photodegradation resistivity. Special QDs have emission around 520 nm, high PLQY (up to 100 %) and narrow FWHM (<20-25 nm). These QDs can be processed at the temperatures up to 100 °C in air. They have high photodegradation resistivity and tested durability in polymer film at 85 °C under blue light with 10 mW/cm² intensity within 1000 hours. LUMAR™ CsPbBr₃ QDs are under the final stage of product development, but you can already request the sample.

QUANTUM SOLUTIONS is the pioneer in commercialization of Perovskite QDs specifically for display applications. Products quality control is provided by the state-of-the-art equipment: UV-vis-IR spectrometer, a fluorescence spectrometer with broadband and integrating sphere capability, Transmission electron spectroscopy and Diffractometer.

Application fields

LUMAR™ CsPbBr₃ QDs are specifically developed to meet the requirements of LCD display industry. But also, these QDs can be used in other optoelectronic devices such as UV photodetectors or solar cells.

Features

- Thermostable Perovskite QDs for LCD applications. Cadmium free, low lead content.
- Bright green emission at 520 nm, narrow full width at half maximum (FWHM < 20-25 nm) and high photoluminescence quantum yield (PLQY up to 100%)
- High photodegradation resistivity and thermostability

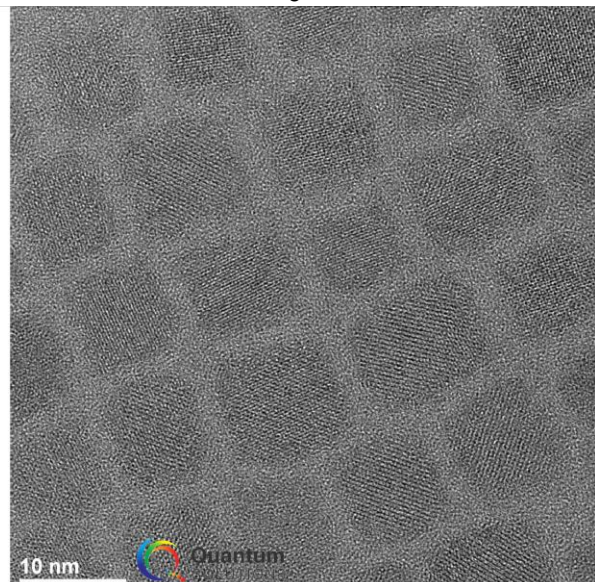
Specification

Catalog Number	LUMAR™ CsPbBr ₃ QDs
Type	CsPbBr ₃ QDs
Form	Yellow paste
Appearance in solvents	Yellow-green liquid
Emission peak	520 ± 5 nm
FWHM	≤ 20-25 nm
PLQY	> 60-70 %
Solid content	> 80 %
Soluble in following solvents	Nonpolar solvents (Toluene, octane, etc.) Nonpolar polymers (PMMA, PS, etc.) Nonpolar UV curable resins (IBOA, etc.)

Photo of LUMAR™ CsPbBr₃ QDs in toluene under UV light

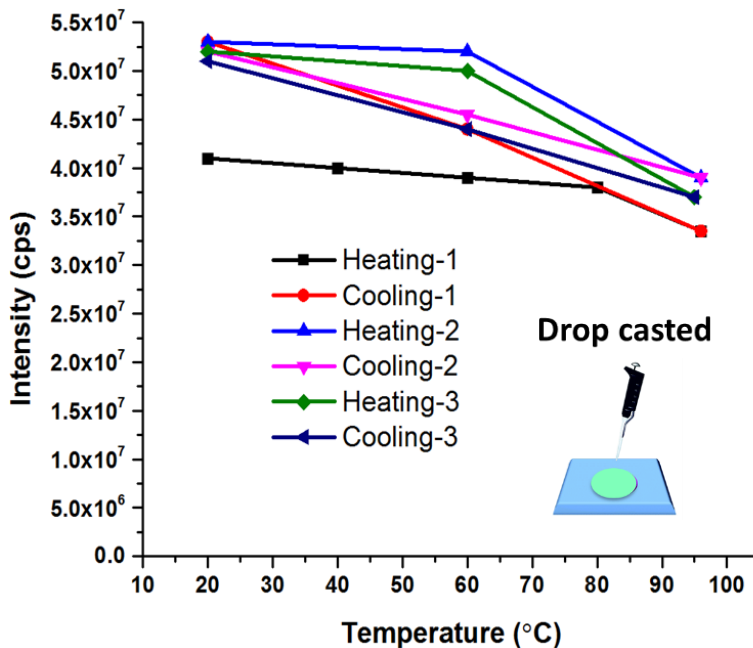


TEM image of LUMAR™ CsPbBr₃ QDs

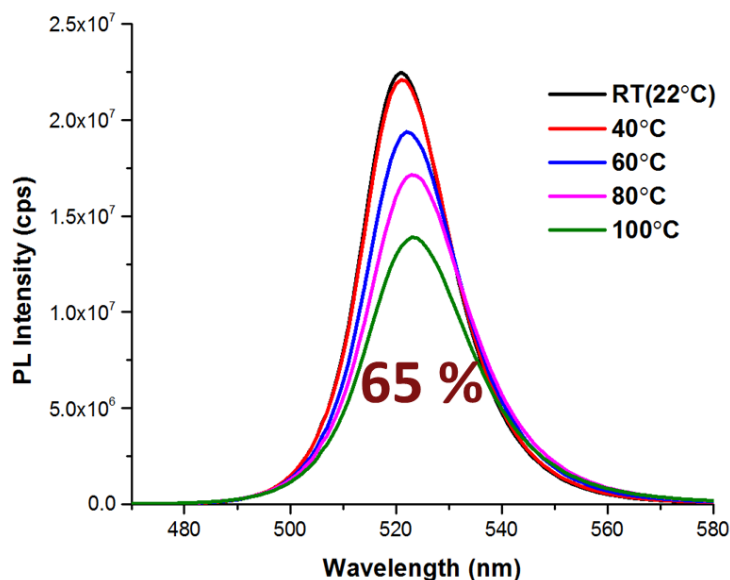


Thermostability in air

Conditions: Quantum Dots drop casted on a glass substrate. Each cycle: heating up the sample from room to 100 °C in air → cooling down to room temperature. Duration of the cycle – 15 minutes, 3 cycles. LUMAR™ CsPbBr₃ QDs are stable at least in the 3 cycles of this test.

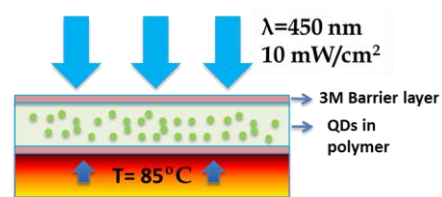


Upon increasing increasing the temperature up to 100 °C, LUMAR™ CsPbBr₃ QDs retain 65 % of its PL intensity

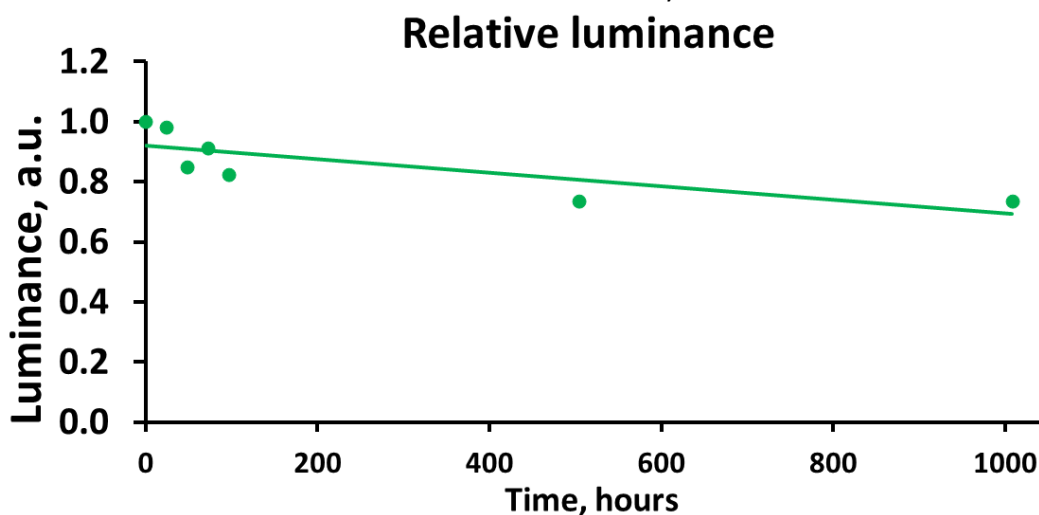


Reliability test in air at 85 °C

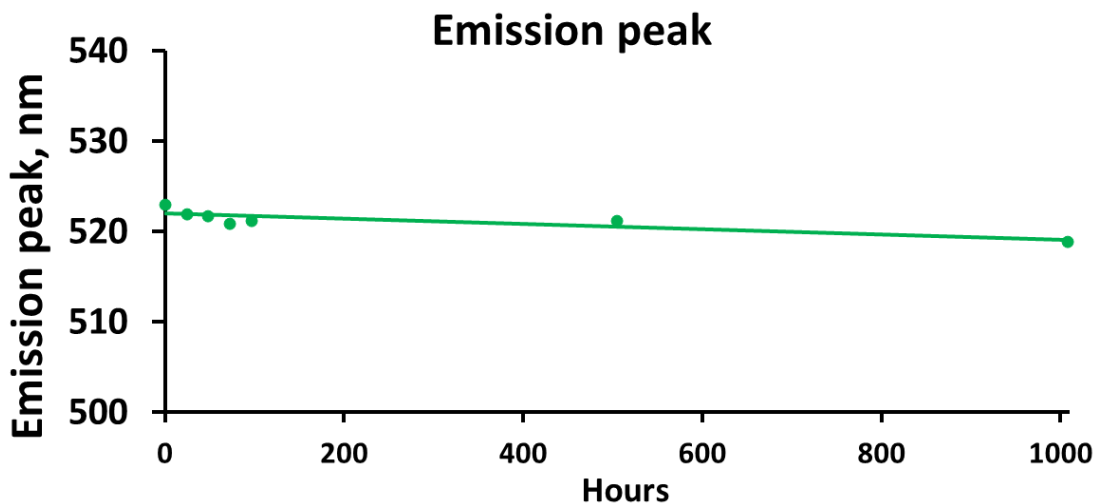
Conditions: Quantum Dots in a polymer film (concentration 0.5 wt %, film thickness 100 μm), laminated by 3M barrier film (3M™ FTB3-50, 50 μm thickness, VWTR < 0.001 g/m²-day @ 20 °C). The film is placed on the hot plate at 85 °C and exposed to blue light illumination (10 mW/cm², 450 nm emission, 15 mm distance).



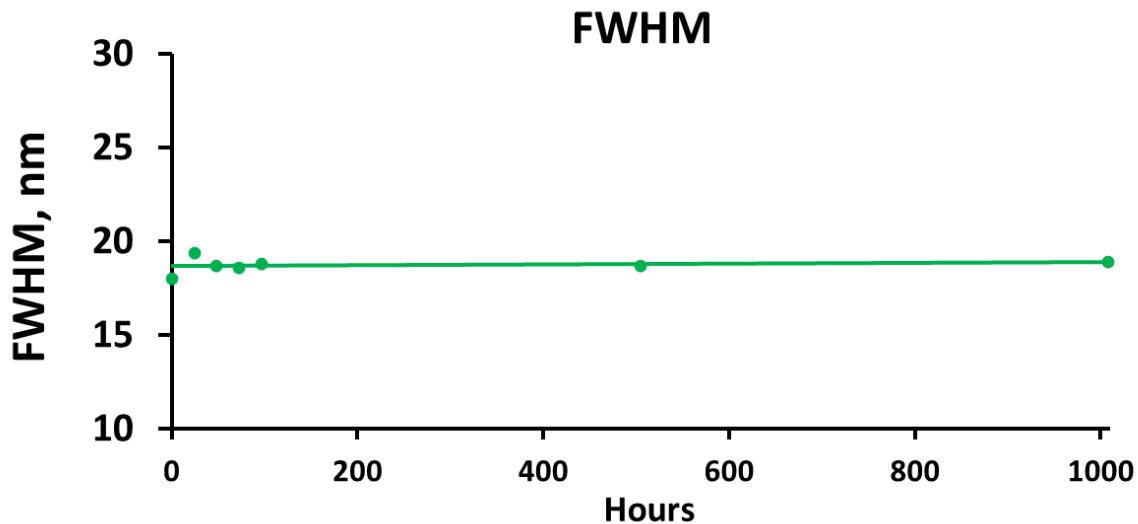
LUMAR™ CsPbBr₃ QDs retain > 70 % of its initial PL intensity after 1000 hours of the tests at 85 °C



LUMAR™ CsPbBr₃ QDs maintains its initial emission peak 520-530 nm after 1000 hours of the tests at 85 °C

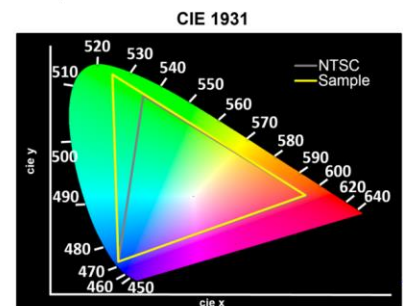
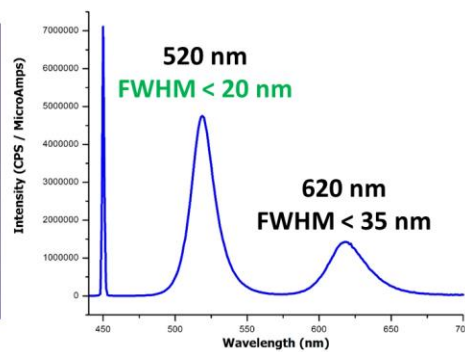
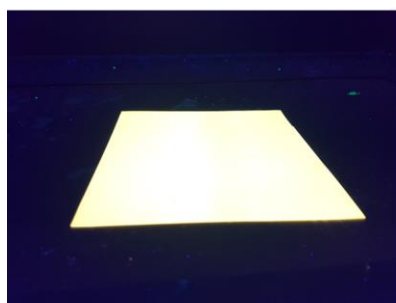


LUMAR™ CsPbBr₃ QDs retain its narrow FWHM < 20 nm after 1000 hours of the tests at 85 °C



Prototyping for LCD backlighting

Conditions: The mixture of LUMAR™ CsPbBr₃ QDs and red CdSe/ZnS QDs in a polymer film with thickness 100 μm, laminated by 3M barrier film (3M™ FTB3-50, 50 μm thickness, VWTR < 0.001 g/m²-day @ 20 °C)



ROHS compliant: $\omega(\text{Pb}) < 0.1 \%$, $\omega(\text{Cd}) < 0.01 \%$,



Notes for handling

This paste can be dispersed in any non-polar solvent (toluene, octane, chloroform etc.) or non-polar polymers (PMMA, IBOA etc.). The colloidal dispersibility of the dispersion depends on viscosity from 10 min for low viscosity toluene to > 24 h for higher viscosity UV resins (2000 cps).

Shelf Life 12 months. Suggest use within 6 months of purchase. Shipping temperature 2-25 °C. Store temperature 2-20 °C. Do not freeze. Store in DARK, in airtight sealed packaging or in a glovebox under N₂. Avoid a long term contact with air.



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