ABOUT QUANTUM SOLUTIONS

QUANTUM SOLUTIONS company is an expert in the synthesis of Quantum Dots (QDs). Our novel patent pending flow reactor synthesis enables us to produce highly uniform QDs with precise size control of tunable emission peaks, narrow emission bands and high quantum yields. Quality control is provided by modern equipment: UV-vis-IR spectrometer, a fluorescence spectrometer with broadband and integrating sphere capability, Transmission electron spectroscopy and Diffractometer.

SCOPE OF APPLICATIONS

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<th>Zero-D</th>
<th>CdSe/CdS</th>
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Quantum Dot LEDs and lasers

QUANTUM DOT LEDS AND LASERS BENEFITS

The uniqueness of Quantum Dot LEDs and lasers is that different wavelengths can be achieved by variation of Quantum Dot sizes that isn’t possible using bulk semiconductor LED and laser technology. Also Quantum Dots become very attractive for optoelectronic devices owing to possibility of fabrication of QD LEDs and lasers by roll-to-roll printing and the compatibility with lightweight, flexible plastic substrates that open the potential for low-cost fabrication of large-area flexible devices. Visible QD LED is considered as a next generation display technology after OLED-Displays, exhibits pure color position, high luminance and lower power consumption.

QD LED FABRICATION

QD LED can be prepared as follows. The hole transporting layer (HTL) is spin-coated on ITO on a substrate. The substrate can be made of glass or polymer material. Then QDs is deposited by spin-coating. For visible LEDs you can use Perovskite or CdSe/CdS Quantum Dots. PbS Quantum Dots are for infrared LEDs. Then an electron transporting layer (ETL) and electrodes are deposited using a thermal evaporation system. Electrodes can be prepared from Ag, Au, Al etc.

RELATED ARTICLES


Quantum dots for backlighting

**QUANTUM DOT BACKLIGHTING BENEFITS**

The QD backlighting system is an emerging technology for LCD and lighting devices. It is the QD polymer film or QD coating that converts wavelength of incoming lights. For example in the LCD backlight the part of blue light from conventional LED is converted into pure green and red colors. Then RGB lights go to the LCD matrix and produce a display image. Such QD backlight system brings a wide color gamut, more bright and contrast images. Also it decreases energy consumption significantly. Nowadays, many TV makers adopted this technology, such as Sony, Samsung and LG.

**QD BACKLIGHT SYSTEM FABRICATION**

QD backlight system can be fabricated as follows. Colloidal Quantum Dots are mixed with polymer solution. The polymer can be PMMA, polyurethane, etc. Then Quantum Dot polymer film is prepared on a suitable substrate. The final Quantum Dot film is used with blue or UV LED to make a backlighting system.

**RELATED ARTICLES**


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Quantum Dots for solar cells

QUANTUM DOT SOLAR CELL BENEFITS

PbS quantum dots are of particular interest in solar photovoltaic applications, in which the semiconductor’s large Bohr exciton radius enables quantum size-effect tuning over the broad solar spectrum. Also this material offers avenues to tandem and multijunction solar cells from a single material via size-effect bandgap tunability. Moreover, their processing from the solution phase should in principle allow rapid, large-scale manufacturing and ready integration with flexible substrates, facilitating roll-to-roll processing.

QD SOLAR CELL FABRICATION

Solar cell devices can be prepared as follows. The PbS Quantum Dot film is deposited in a layer-by-layer fashion by spin coating on HTL/ITO/glass substrate layers. P-type PbS quantum dots of various band gaps can be deposited. Then ETL and top electrode consisting of Ag or Au are deposited by thermal and electron beam evaporations.

RELATED ARTICLES


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Quantum Dots for photodetectors

**PRODUCT PORTFOLIO:**

- PbS Quantum Dots
  - For infrared light sensing
- Perovskite Quantum Dots
  - For visible light sensing
- CdSe/CdS Quantum Dots
  - For visible light sensing

**QUANTUM DOT PHOTODETECTOR BENEFITS**

Photodetectors for infrared light can be utilized in night vision, atmospheric spectroscopy for gas detection, biomedical imaging, quality control and product inspection. Photodetectors for visible light is utilized in image sensors to transform incoming light into electronic signal, and also be used in surveillance, machine vision, industrial inspection, spectroscopy, and fluorescent biomedical imaging. The advantages of using Quantum Dots are that they can be easily integrated with silicon electronics or with flexible organic substrates, and also be deposited on electrodes prefabricated on a substrate by simple methods: ink-jet printing, solution casting and low-temperature evaporation. Additionally, optical absorption and emission spectra of QDs are widely tunable through the quantum size effect.

**QD PHOTODETECTOR FABRICATION**

QD photodetector can be fabricated as follows. Electrodes are deposited on the substrate by evaporation. Then colloidal Quantum Dots or mixture of QDs in polymers are spin-coated on a substrate to form solid QD film or QD polymer composite between electrodes.

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