

CdSe/ZnS quantum dots

Quantum dots are inorganic semiconductor nanocrystals with excellent optical properties, and have the advantages of high fluorescence quantum yield, wide excitation spectrum, narrow emission spectrum, and good light stability. CdSe/ZnS quantum dots are gradient alloyed semiconductor materials with size dependent optical/electronic properties,

high fluorescence efficiency, low toxicity and easy cell absorb. Through surface passivation of high band gap ZnS shell, low luminescence efficiency caused by defects and surface-trap states can be significantly minimized. CdSe/ZnS quantum dots can be used in highly sensitive cellular imaging, drug delivery and light emitting devices.

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Properties

CdSe/ZnS quantum dots

Tunable color Emission

The emission frequency from QDs can be tuned to say arbitrary point from ultraviolet to near infrared wavelength range by changing particle size and/or chemical composition.

Highly Pure Color Emission

The emission spectra from QDs are narrow, symmetric, and without red-tail.

High Efficiency

To date, the quantum from efficiency (QY) of QDs can reach up to more 90%, some QDs have the QY nearly 100%.

Highly Bright

The emission intensity from single QDs is several hundred times higher than that of a single organic fluorescent dye

Easy Excitation

Qds have broad and continuous excitation spectra, allowing using a single source excitation to simultaneously excite multicolor Qds.

Large Stokes Shift

QDs Differ from organic fluorescent dyes by having large stokes shifts, avoiding the emission and excitation overlap during signal detection.

High Stability

Unlike Organic Fluorescent dyes, QDs have strong resistance to photo-bleaching rate quickly, thus can be used for bio-imaging and photo-electronic devices.

Biocompatible

Through surface modification, QDs can be made to have low cytotoxicity and less harmful to organism and biological living tags.



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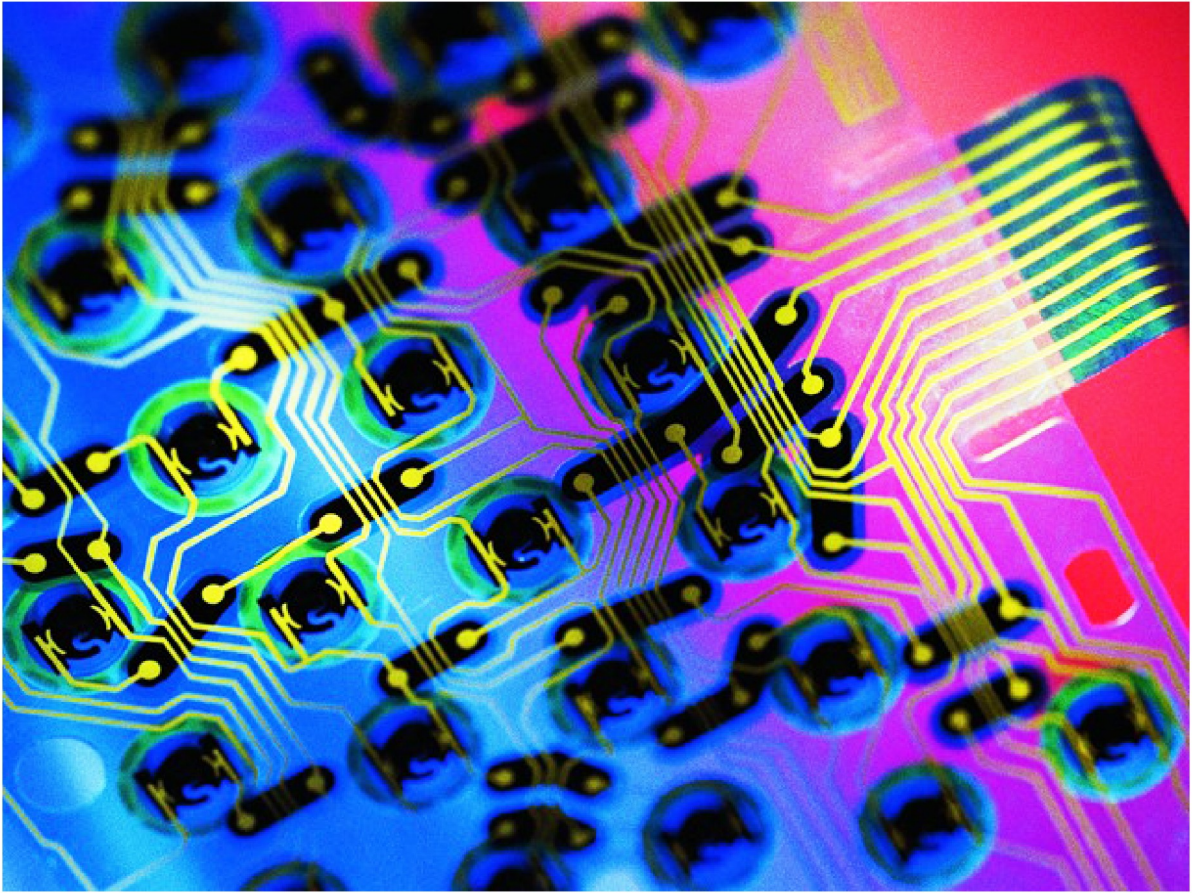
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Technical Specification

Stock No.	Purity	Quantum Yield	Emission Peak	FWHM	Solvent
NS6130-12-000761	99.9%	---	635nm	40nm	Toluene or customer required
NS6130-12-000126	99.9%	50-70%	640nm	25-30nm	Toluene or customer required
NS6130-12-000125	99.9%	80-90%	620nm	25-30nm	Toluene or customer required
NS6130-12-000124	99.9%	80-90%	600nm	25-30nm	Toluene or customer required
NS6130-12-000123	99.9%	80-90%	580nm	25-30nm	Toluene or customer required
NS6130-12-000122	99.9%	70-90%	560nm	25-30nm	Toluene or customer required
NS6130-12-000120					Toluene or customer required
NS6130-12-000119	99.9%	50-70%	500nm	25-35nm	Toluene or customer required

Applications

CdSe/ZnS quantum dots

Bioimaging

The latest generation of quantum dots has great potential for use in biological analysis applications. The small size of quantum dots allows them to go anywhere in the body making them suitable for biological applications such as medical imaging and biosensors. They are widely used to study intracellular processes, tumor targeting, in vivo observation of cell trafficking, diagnostics and cellular imaging at high resolutions. Various kinds of organic dyes have been used in bioimaging for decades. However, with the advancement of nanotechnology, QDs have been considered to be superior to traditional organic dyes in many respects. For bioimaging applications, the fluorescent probes have to remain well-dispersed and stable in the aqueous medium with a wide range of pH and ionic strengths. Fortunately, numerous approaches have been developed to make the QDs water-dispersible. Up until now, great efforts have been devoted to employing QDs for in vitro and in vivo imaging, which are expected to be important to the diagnoses of many diseases, the understanding of embryogenesis, and lymphocyte immunology.

Photovoltaic devices

Because of the tunable of the absorption spectrum and high extinction coefficient, QDs are desirable for light harvesting, is beneficial for photovoltaic devices. QDs have the potential to boost the efficiency of silicon photovoltaic cells and lead to reduced costs. Quantum dots can offer a significant increase in efficiency, by using dots of varying sizes top of each other with the largest band gaps on top. Incoming photons will be transmitted until reaching a layer with a band gap smaller than the photon energy. With enough layers each photon will excite an electron with a band gap close to its own energy and thus waste a small amount of energy.

Light emitting devices

QDs are promising for light emitting devices and may improve the performance of light-emitting diode (LED), leading to the new design of "Quantum Dot light Emitting Diode". QDs are very useful for display devices considering their unique optical properties. They are capable of presenting visibly more accurate and outstanding colors.

Quantum computing

Quantum dots have paved the way for powerful 'supercomputers' known as quantum computers. Quantum computers operate and store information using quantum bits or 'qubits', which can exist in two states – both on and off simultaneously. This remarkable phenomenon enables information processing speeds and memory capacity to both be greatly improved when compared to conventional computers.

Solar cell

A quantum dot solar cell (QDSC) is a solar cell that uses quantum dots as the captivating photovoltaic material. It is used to replace bulky materials such as silicon, or copper indium gallium selenide. Quantum dots have band gaps that are adjustable through a wide array of energy levels by changing the size of the dots. Because the band gap of the quantum dots can be adjusted, quantum dots are desirable for solar cells. Frequencies in the far infrared that are characteristically difficult to achieve with traditional solar cells can be obtained using lead sulfide colloidal quantum dots. Half of the solar energy reaching the Earth is in the infrared region. A quantum dot solar cell makes infrared energy as accessible as any other.

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