INTRODUCTION OF QUANTUM DOTS

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ABSTRACT

This work discusses the new application of quantum dots in biotechnology, in probe genetic sequence and for example to detect cancer. The next application of quantum dots is in optical transistor, telecommunications, conventional led and Solid State lighting- Electroluminescent Quantum Dot Nanocrystal Devices.

1 INTRODUCTION

Quantum dots is semiconductor microstructure of different material. Size of quantum dots is ten nanometr. Similarly as on atom she contain electron locate in a position with definite value energy. This attribute of quantum dots we using for application which describe in next chapters.

2 USE QUANTUM DOTS IN BIOTECHNOLOGY

We use quantum dots for detection and expression oligonucleotide sequencing. The new product for this application is EviProbes™.

Requisite attributes for application in biotechnology :

1. Increased photostability
2. Increased assay sensitivity
3. Tunable emission wavelength
4. Probes can be excited with a broadband, inexpensive light source

The next new product is EviArray™. It is fabricated with nanocrystal tagged oligonucleotide probes which are also attached to a fixed substrate in such a way that the nanocrystals can only fluoresce when the DNA probe couples with the corresponding target genetic sequence.

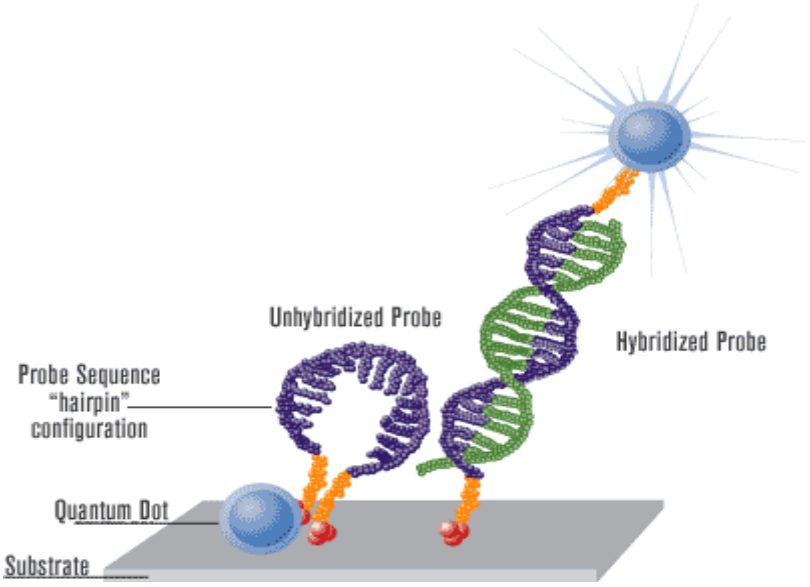

Fig. 1: *Application quantum dots to detection DNA sequence*

3 APPLICATION QUANTUM DOTS TO DETECTION CANCER

Another minuscule molecule that will be used to detect cancer is a quantum dots. Quantum dots are tiny crystals that glow when they are stimulated by ultraviolet light. The wavelength, or color, of the light depends on the size of the crystal. Latex beads filled with these crystals can be designed to bind to specific DNA sequences. By combining different sized quantum dots within a single bead, scientists can create probes that release distinct colors and intensities of light. When the crystals are stimulated by UV light, each bead emits light that serves as a sort of spectral bar code, identifying a particular region of DNA.

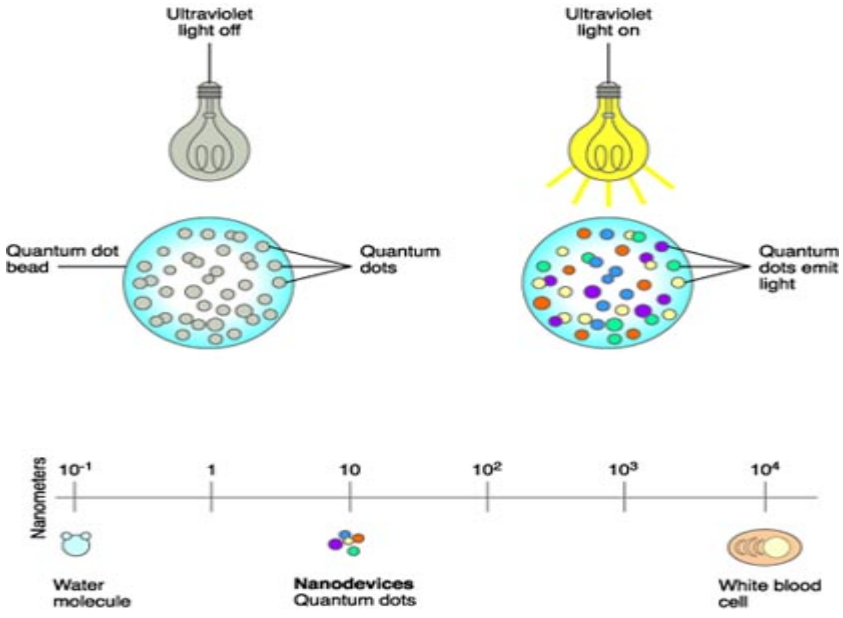

Fig. 2: *Basic princip for detection cancer*

4 OPTICAL TRANSISTORS

The ultra-fast switching speed of the PbSe EviDots™ combined with an innovative micro-resonator design serves as the basis for Evident's optical transistor. A prototype resonator cavity has been completed making use of lithography on silica wafers. These planar lightwave circuit devices are designed to be optically actuated and switch on and off in 1 psec. This simple device forms the basis of optical logic and is the foundation for telecommunications and other applications.

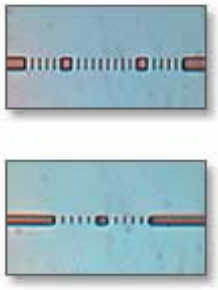

Fig. 3: *Optical transistor*

5 TELECOMMUNICATIONS

Evident's one picosecond all-optical transistor forms the basis for optical packet switching for telecom routing applications. The schematic shows a planar lightwave circuit where header and data information are propagating from left to right. Evident's optical transistor is in the path of the data and is switched via amplified header information. Hence, the header provides the actuation signal thus eliminating the need for electronic conversion. When the header contains an "ON" signal, the data passes down line 1 (for example), while an "OFF" signal results in propagation, down line 2. The PbSe EviDots™ determine the switching speed of this device, hence one picosecond all optical routing may be attainable.

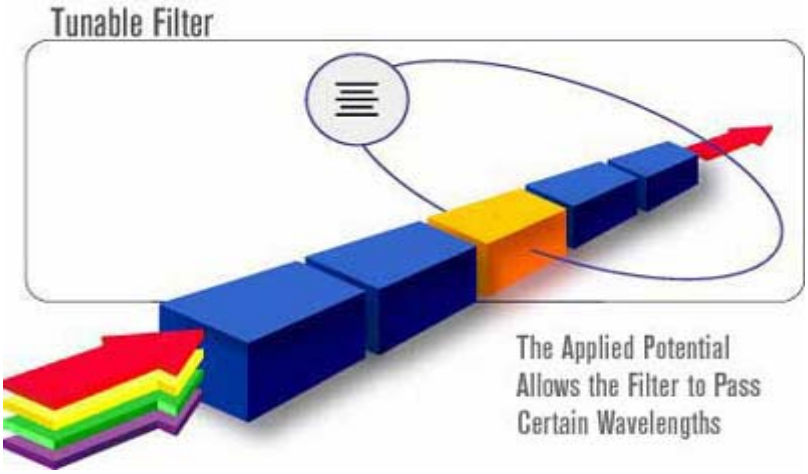

Fig. 4: *Optical packet switching for telecom routing applications*

6 SEMICONDUCTOR NANOCRYSTAL QUANTUM DOTS FOR CONVENTIONAL LEDS

Semiconductor nanocrystals (quantum dots) can be utilized with traditional LED's as a phosphor in order to create high quality white light or high purity specialty colors that span the spectrum from the UV, visible, through the infra-red. Nanocrystals can be used alone or in combination with other traditional rare-earth phosphors to best combine brightness, lonegivity, and color quality. Because of the flexibility in processing nanocrystals into a usable form, they can be deposited directly on top of the LED die, within the encapsulant material, or with the lens-cap, illuminaires or fixtures.

Nanocrystals (quantum dots) are single excitation source tunable light emitters that can be used to make efficient green, orange or other wavelengths where traditional LED dies and phosphors have low efficiency. They can be used as an additive to increase the Color Rendering Index (CRI) and produce warmer or cooler tones to white light for architectural lighting purposes or for certain medical applications.

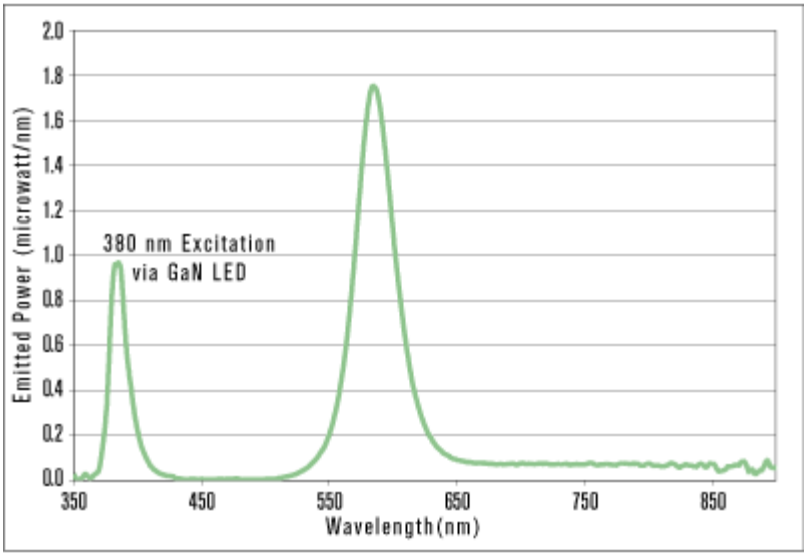

Fig. 5: *585 nm birch yellow photoluminesensce*

7 SOLID STATE LIGHTING- ELECTROLUMINESCENT QUANTUM DOT NANOCRYSTAL DEVICES

Evident Technologies has demonstrated direct electroluminescent emission at visible wavelengths and at IR wavelengths important for optical telecommunications. The wavelength and the bandwidth of the emitted light was directly determined by the size and composition of the dispersed nanocrystals within the device. The company has expertise in modifying the nanocrystal surfaces with molecules that facilitate charge transport into the nanocrystals from the conducting matrixes.

Using nanocrystals (quantum dots), vibrant colors including blue and deep blues can be

generated. Because of the inorganic nature of the particles, they are inherently stable and can increase the operational lifetimes of the ensuing devices.

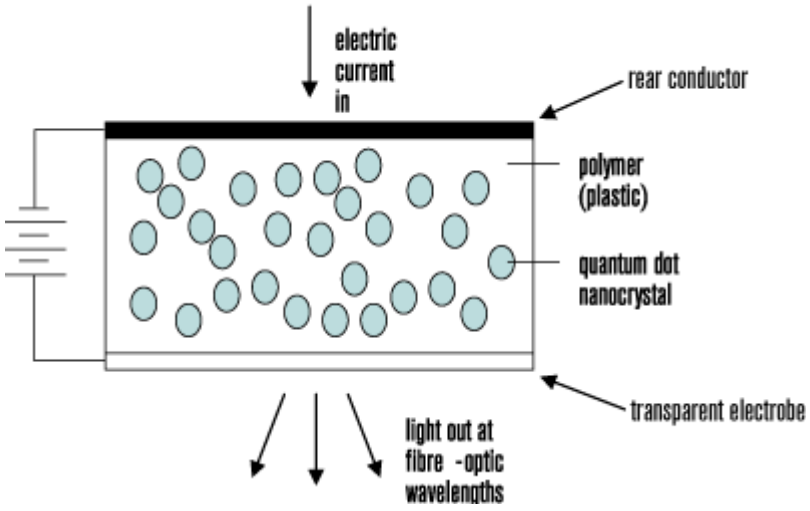

Fig. 6: *Device structure for PbSe nanocrystal-based electroluminescent device*

8 CONCLUSSION

The results show constricted possibilities of appling the quantum dots. Nanotechnology is perspective branch of knowledge which infiltrates into normal life. Nanotechnology helps increase research targets, production and economic system.

REFERENCES

[1] http://press2.nci.nih.gov/sciencebehind/nanotech/nano00.htm

[2] http://www.evidenttech.com