



Core Shell EviDots: High Yield, Narrow Emission, Photostable Fluorescent Labels

Core Shell EviDots: enabling a new standard for fluorescence

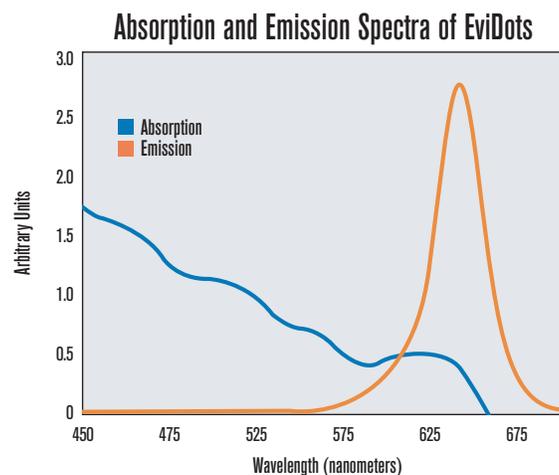
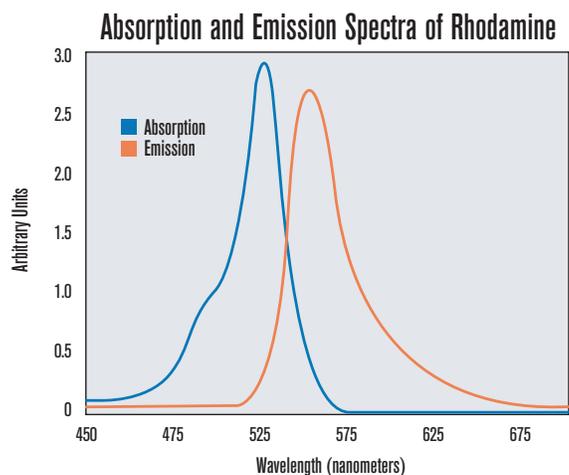
EviDots™ are very small crystals of a semiconductor material, in the nanometer size range (billionths of a meter). Their unique optical, magnetic and electrical properties are dependent on size and composition, both of which are controlled during synthesis, allowing these properties to be “tuned” for specific applications. EviDots fluoresce brightly under ultraviolet irradiation, and this fluorescence is both enhanced and stabilized by surrounding the core EviDots with a “shell” of another semiconductor material. These “Core Shell EviDots™” are premium material for a wide variety of fluorescence applications, particularly those which call for simultaneous emission of multiple colors.

Multicolor fluorescent labels

Fluorescent molecules are in high demand for experiments in which a target structure is to be labeled, tracked or quantified. The fluorescent molecule, or “label”, can be bound to a ligand with specific affinity for the target of interest, or simply dusted on the surface of an object of interest, leaving a fluorescent residue wherever that object goes. The observer detects the label by stimulating it with light of one color (the “excitation wavelength”) and detecting another color (the “emission wavelength”) emitted by the label in response. On a graph of wavelength versus intensity, the emission spectrum is defined by a peak wavelength, a peak intensity, and a width of wavelengths across the peak at a level half that of the maximum intensity (“full-width half-max”). Each excitation photon has the chance to excite the EviDot to emit the specific percentage is referred to as “quantum yield”, which generally corresponds with brightness, and varies from label to label.

Applications and Needs

New fluorescent labels come on the market every year, and entire companies are dedicated primarily to their discovery and manufacture. Labels are used in fluorescence microscopy, fluorescence-activated cell sorting, real-time polymerase chain reaction (PCR) assays, nucleic acid sequencing, hybridization and arrays, and immunoblotting, among other applications. Usefulness of a label is limited by its cost, the narrowness of its emission spectrum, the number of available wavelengths which can be distinguished from each other, and the rapidity with which the label disintegrates when excited by a phenomenon known as photodegradation.



Advantages of Core Shell EviDots

Fluorescent labels have been widely available for half a century, mostly deriving from one of a dozen or so organic chemical structures. These organic reagents typically have excitation and emission spectra between 400 and 700nm, full-width half-max of about 40nm, overlap between excitation and emission spectra near the peaks of each, and quantum yields of 20% to 90% depending on the individual molecule. Because emission and excitation spectra are of equal breadth and tend to overlap, an intense narrow-spectrum light source such as a laser must often be used to excite organic molecules at a wavelength which does not overlap with emission. Organic labels also tend to photodegrade, limiting the amount of time available to collect information from a weak signal. Our Core Shell EviDots offer distinct advantages over traditional fluorescent labels and avoid many of their inherent shortcomings. The emission and excitation spectra of EviDots are markedly asymmetric, with a broad peak of excitation wavelengths in the deep blue and ultraviolet spectrum and narrow emission peaks with a full-width half-max of approximately 25nm in the visible spectrum. Using multiple EviDots compositions, our emission wavelengths extend from the visible spectrum all the way through the infrared, from approximately 450 to 2000nm. The narrow emission spectrum and tunability throughout the visible and infrared allow many colors to be resolved simultaneously, and a laser is not required for excitation, reducing instrumentation costs. Quantum yields of our core-shell EviDots range up to 90%, towards the upper end of organic labels, and the EviDots do not photobleach appreciably with hours of high-energy excitation, allowing prolonged integration of weak signals over time.

EviDots Potential

The potential of semiconductor nanocrystals as fluorescent labels has been widely appreciated ever since Hines and Guyot-Sionnest invented the method for making the core shell structure in 1995. However, new devices and reagents using this material have been limited by commercial availability of core-shell semiconductor nanocrystals until now. Evident Technologies is pleased to have overcome this limitation by making Core Shell EviDots available to investigators. We anticipate rapid commercialization of new applications with this material, and are collaborating with other companies as well as researchers at universities, academic medical centers, and government research laboratories in order to make the future become evident.

About Evident Technologies

Evident Technologies, Inc. is a world-leader in manufacturing semiconductor nanocrystals and their applications. We focus on biotechnology applications of nanotechnology with state-of-the-art materials and in leading the way for expanded applications in telecommunications, optical computing, and lighting applications. We enable other companies to explore a plethora of applications and innovations in nanotechnology.



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