Infrared-Emitting Quantum Dots

Stable composition-gradient core/shell quantum dots for absorption of visible light and emission of infrared radiation for applications such as tagging, anti-counterfeiting, sensing, imaging, and IR display

Georgia Tech inventors have developed a method for making stable and efficient composition-gradient IR-emitting quantum dots using a cation exchange method. The tunable IR-emitting quantum dots are first fabricated using a one-pot synthesis process followed by a simple cation exchange reaction. Although quantum dots are often considered unstable, the resulting composition-gradient core/shell quantum dots are highly stable and have tunable absorption and IR-emitting properties. These quantum dots can be processed into polymer film coatings on a variety of substrates to allow for visible light to IR radiation conversion.

Summary Bullets

- **Robust** – more stable than current quantum dots
- **Tunable** – optical properties are tunable based on size, structure, and composition of the quantum dots
- **Efficient IR-emission** – allows for enhanced display definition and multi-band IR scene projection

Solution Advantages

- **Robust** – more stable than current quantum dots
- **Tunable** – optical properties are tunable based on size, structure, and composition of the quantum dots
- **Efficient IR-emission** – allows for enhanced display definition and multi-band IR scene projection

Potential Commercial Applications

- Sensing, Display, and Imaging
- Military
- Electronics
- Aerospace

Background and More Information

Quantum dots (nanoscale particles of semiconducting material) can be prepared with tunable emission wavelengths from the same semiconductor material by controlling the particle size. Efficient infrared (IR) light-emitting quantum dots ranging from near IR to shortwave IR to mid-wave IR are desired for various applications. For example, in the case of IR display, current IR scene projector technologies suffer from low

frame rates and limited wavelength tunability. Stable and efficient IR-emitting quantum dots present a solution for the development of high performance and low-cost IR scene projectors.

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IP Status

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Publications

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