White Light Emission Using Quantum Dots in Photonic Crystals

Enhanced lighting technologies, such as quantum dots and organic LEDs, can revolutionize the lighting industry by offering brighter, more energy efficient lighting options. However, obtaining white light emission is a well-known challenge. This technology enables white-light LED emission using quantum dots in two-dimensional photonic crystals, nanostructured materials that can prohibit propagation of light within certain frequency bandgaps.

Controllable color temperature emission by quantum dots in photonic crystals

When several similar photonic crystal defects are placed in close proximity, they will be coupled. When excited optically or electronically, the crystal emits light, and the resonance mode splits into several modes with unique frequencies. These frequencies can be mixed together. By placing quantum dot ensembles within photonic crystal cavities, researchers can mix red, green, and blue frequency components to create white light with a controllable color temperature. This helps develop “warm” light, which is highly desirable for consumer lighting applications.

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Applications:
- White light emitting devices with controllable color temperature.
- Color-mixing.

Advantages:
- Produces controllable white light emission.
- Allows unprecedented control of wavelength selection.
• Allows collection of light emission from multiple defect groups, since array of defect groups are created on the substrate.
• Light emission can also be achieved using electrical pumping.

**Patent information:**

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**Licensing Status:**

Available for licensing and sponsored research support

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**Related Publications:**


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