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Intellectual Property

Status:

Patent Pending

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Dynamic Controlled Colored Lasing in Single Nanowire

AzTE Case # M12-056P

Background

With the mounting global energy crisis, and the increasing push for sustainable solutions, more attention is being paid to the way we light up our world. Lighting uses about 18 percent of the electricity generated in the U.S. and another 4 to 5 percent is spent on removing the waste-heat generated by the traditional lighting sources. It is estimated that, with good design, lighting energy use in most buildings can be cut at least in half while maintaining or improving lighting quality.

One such 'good design' is solid state lighting. Some of the common approaches to solid state lighting include the use of LEDs, OLEDs, and PLEDs. While these technologies have been wildly effective and popular in the areas of electronic display they present some limitations when it comes to white light emission which is most important when looking at reducing energy consumption by regular overhead lighting.

Invention Description

Researchers at Arizona State University have developed a new lighting source that overcomes the major challenge of the traditional Solid State Lighting sources, unaesthetic white light, while maintaining reasonable conversion efficiency and source stability. This is achieved by applying a new method to an old technology. By using specific techniques in growing semi-conducting nanowires, the wires are made to emit light at very targeted wavelengths. The result is, using the tricolor based white emission principle, rationally designed semiconductor-based light-emitting materials or structures with both reasonable power efficiency and color quality. This same technology can easily be applied to the growing industry of electronic display technologies and to scientific and technical instrument manufacturing.

Potential Applications

- Lighting
- Displays and Projection
- Scientific & Technical Instruments Manufacturing

Benefits and Advantages

- **Truer Color** – The ability to finely tune the semi-conductor band gap allows for the whole visible spectrum to be accurately represented.
- **High Efficiency** – No stokes energy loss as is seen in phosphor based technologies, and significantly less heat loss than is experienced by incandescent sources.
- **Simpler Design** – The nanowires represent a simplification of the LED; what the LED accomplishes with three separate diodes, the nanowires accomplish in a single wire.