

High UV efficiency fluorescent lighting

Background

In conventional fluorescent lighting, electric current in the gas phase excites mercury or other ion vapor which produces a broad range of ultraviolet (UV) light, in addition to visible light. The UV light in turn causes a phosphor coating on the inside of the bulb to glow. Combination of converted and directly emitted visible light makes up the total output.

Conventional fluorescent lighting systems may use multiple phosphors that coat the inside wall of a fluorescent tube. However, much of the UV radiation created by the discharge is not used because it is not absorbed by the phosphors, and is filtered or reflected back into the tube, which makes the devices less efficient and/or more costly to manufacture. Multiple rare-earth-metal-based phosphors emitting complementary colours are generally needed to approximate white light.

There is therefore a need to provide a new lighting material that makes full use of the UV light and that can generate a desired quality of white light in an energy-efficient and economically viable way.

Description of the invention

Researchers at the University of Waterloo have created a low-cost hybrid nanomaterial, "NanoLite", which illuminates pure white light and can be processed into light emitting structures and devices from liquid (i.e. solution) or solid (i.e. powder) forms. This NanoLite material makes full use of the UV light (absorbs broadly in the UV spectral range) and converts it into visible light. This allows for very energy efficient fluorescent lighting to be made using NanoLite. Additionally it is possible to create fluorescent lights that do not require the use of mercury. Because of its versatility and chemical compatibility this material can be used in various configurations and devices and can also be tuned to produce any colour of light.

Advantages

- Full use of UV light (broad absorption) to create visible light with higher efficiency
- Significantly less expensive material
- Specialty lighting for health and agriculture applications
- Potential for mercury free lamps

Potential applications

- Substantially increase the efficiency of fluorescent lighting by increasing their UV efficiency (full absorption)
- Eliminate the use of toxic materials in fluorescent lights
- Tunable to any colour
- Suitable for speciality lighting applications

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