Luminescence Intensity Ratio Method of co-doping Eu2+

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Technology description

Technology Need

In order to develop electronics, medical devices or radiation detection devices producing accurate result with precision, enhanced luminescence intensity, higher resolution and better sensitivity are needed. Currently ZnS:Mn phosphors have been widely used in solid state lighting, displays, radiation detection, medical imaging and biological sensing. However, the brightness produced by the phosphors needs to be improved. Fluorescence intensity ratio (FIR) is a very sensitive and reliable method of detection. FIR has been extensively used for temperature measurement, biological sensing, and trace water detection methods. However, the FIR is rarely applied in radiation detection where the brightness is not up to the standard.

Invention Description/Solution

Researchers at UTA have developed a method to enhance the luminescence intensity by controlling the ratio of ZnS:Mn and co-doping Eu2+ or other compounds. With this invention, 5.5 times of photoluminescence and 2.5 times of X-ray luminescence of Mn2+ can be enhanced after optimized Eu2+ concentration. Thereafter, accurate result with precision, enhanced luminescence intensity, higher resolution and better sensitivity are achieved. Hence, doped nanoparticles can be used as function of radiation dose. Different isotopes may provide signatures for nuclear identification or nuclear forensics.

Application area

Solid state lighting
Full-color displays
Optics communications
Sensors
Medical imaging
Radiation detection
Baggage& cargo screening
Border security

Advantages

Significant photoluminescence & X-ray luminescence enhancement
New, simple & better detection method
Better sensitivity & higher resolution
Adjusted ratio to tailor the measurement need

Institution

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