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The design of hybrid x-ray detector using quantum size effect

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2-6 group material(e.g. CdTe, CdS, CdSe) is utilized as a photoconductor at the bulk level unlike as a phosphor when manufactured at the nanoscale level. Conceived by this fact, one invented an x-ray detector which hybridized two different kinds of layers from one material, which was acted as a photoconductor in the bulk state and also worked as a phosphor at the nanoscale. This system works as following: First, an x-ray has changed into light on nanoscale phosphor layer, and then the light has been received on photoconductor layer. The emitted light on phosphor layer has the exact wavelength range that is required on a photoconductor. The change of electronic energy level density depending on the size of a crystal within nano-particle affects optical and electrical characteristic variation, which reflects the quantum size effect. On account of this effect, one can utilize two different kinds of layers from one material by regulating the size of the material. As a result of that, by changing emission wavelength with size control of a particle, the most appropriate absorption wavelength to a photoconductor in the bulk state can be emitted on nanoscale phosphor. There seems higher conversion efficiency in the hybrid structure using the same material than using the different materials. Luminescence efficiency of nanoscale phosphor was measured using PL spectroscopy and generated signal from the photoconductor was measured using electrometer and oscilloscope

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