Development of thin-film electroluminescent device using inorganic oxides

Plane emission of red light with a starting voltage of ≈10 V

We have developed a perovskite thin-film electroluminescent device, opening up a new optical application of perovskite materials. Complete epitaxial growth of all of the layers and very flat interfaces with monoatomic steps have been obtained. With increasing driving voltage, the intensity of electroluminescence dramatically increases. The sharp electroluminescence peak at around 610 nm with 12 V becomes much stronger with increasing AC voltage. High-quality red light is emitted and the working voltage for whole-surface electroluminescence is as low as 10 V.

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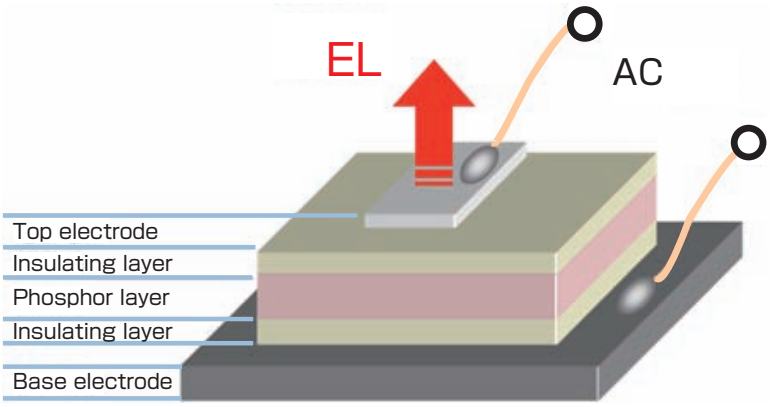

Schematic view of the developed inorganic electroluminescence(EL) device

New, simple method for separation of metallic and semiconducting carbon nanotubes

Freeze, thaw and squeeze method paves the way for mass production

We have developed an easy-to-use method to separate metallic and semiconducting single-wall carbon nanotubes (SWCNTs) using agarose gel. The most effective separation was realized by a simple procedure in which a piece of gel containing SWCNTs was frozen, thawed, and squeezed with the fingers (Figure). This process does not need any special equipment other than a domestic freezer and affords a solution containing metallic SWCNTs and leaves a gel containing semiconducting SWCNTs. The method is so simple that we can easily proceed to the automation and scaling up of the process. This high-yield, low-cost, and scalable method could be suited for the industrial production of metallic and semiconducting SWCNTs, facilitating basic and applied research on SWCNT electronics.

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Separation of metallic and semiconducting SWCNTs by a freeze, thaw and squeeze method using SWCNTs-containing agarose gel

A solution containing metallic SWCNTs and gel debris containing semiconducting SWCNTs are simultaneously obtained by squeezing the SWCNTs-containing gel after freeze and thaw processes.