FABRICATION METHOD OF TRANSPARENT ELECTRODE AND SEMICONDUCTOR DEVICE USING THE SAME

Affiliation : Korea university **Type of Partnership :** Open for negotiation **Cost :** Open for negotiation
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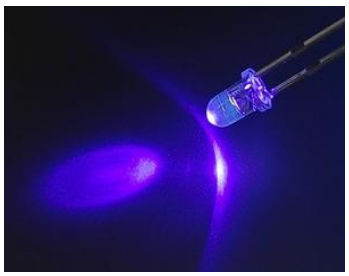
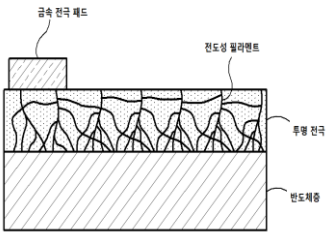




〈The structure of semiconductor device that has a transparent electrode〉

Abstract

It is related to a method for forming a transparent electrode that can be applied to a semiconductor. It has high transmittance, high conductivity and a good ohmic contact properties, so we can use many industry like LED and solar battery

Problems with Existing Technology

Transparent electrode technology is required to exhibit high transmittance, high conductivity, and good ohmic characteristics.

- Transparent electrodes have been used in various application fields such as LEDs, solar cells, medical UV sterilizers, and fisheries, and the application fields and their demands have been gradually increased.
- Pre-existing technology does not have the high transmittance, high-conductivity and ohmic contact, so it is hard to commercialize ultraviolet LED.

Technology Readiness Level

TRL 3 : Experimental Proof of Concept

TRL1	TRL2	TRL3	TRL4	TRL5	TRL6	TRL7	TRL8	TRL9
Basic Technology Research	Technology Concept formulated	Experimental Proof of Concept	Technology validated in lab	Technology validated in relevant environment	Technology demonstrated in relevant environment	System Prototype in operational environment	System complete& qualified	Full commercial application

Differentiation and effect

Differentiation

Forming process that can change the transparent electrode into low resistance state

- A transparent electrode is formed of a transparent material which changes from a high resistance state to a low resistance state by an applied electric field.

Effect of Technology

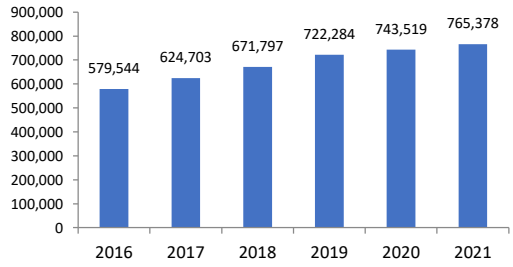
High transmission and ohmic contact are features of transparent electrode

- It has high transmittance not only in visible light but in ultraviolet lights

Technology Application Field

It can be applied to wide range of electronic category including ultraviolet, LED, OLED , solar battery and so on

Market trends



KAPID, Current status and prospect of domestic and global mining industry, 2015.

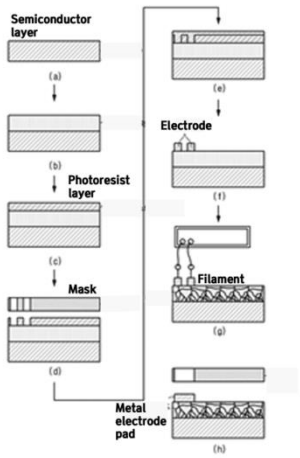
<Market size of LED industry, million USD>

- In 2016, the world LED market grew 2.6% year-on-year to $ 579.5 billion, which is expected to increase steadily to $ 765.3 billion in 2021.

Technology Implementation

Method for making transparent electrode

- Forming the transparent electrode and photoresist layer on the semiconductor layer
- Making the electrode pattern over the photoresist layer
- Filling out the inside with the metal deposition
- Removing the metal and photoresist layer for completion the electrode
- Making the transparent electrode low resistance when the voltage is introduced at the electrode forming the conductive filament inside the transparent electrode



<Method of making the transparent electrode>

List of related patents

No.	Title of Invention	Patent No./ Application No.
1	METHOD FOR FORMING TRANSPARENT ELECTRODE AND SEMICONDUCTOR DEVICE MANUFACTURED USING SAME	US 14/398,783
2	VERTICAL TYPE LIGHT EMITTING DEVICE HAVING TRANSPARENT ELECTRODE AND METHOD OF MANUFACTURING THE SAME	US 15/370,076
3	LIGHT RECEIVING ELEMENT HAVING TRANSPARENT ELECTRODE AND METHOD FOR MANUFACTURING SAME	US 14/769,185
4	ORGANIC LIGHT EMITTING DEVICE HAVING TRANSPARENT ELECTRODE WHERE CONDUCTING FILAMENTS FORMED AND METHOD OF MANUFACTURING THE SAME	US 14/429,439