

## p-Cu<sub>2</sub>O thin film/n-ZnO nanowire based ultraviolet sensors by sol-gel method

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**초 록:** Cu<sub>2</sub>O 는 산화물 반도체중 자연적으로 p-type 특성을 가지고 있으며 n-type 의 ZnO 와의 p-n 접합을 형성하고 자외선 센서로서의 특성을 보여주었다. 나노구조물의 자외선 센서의 제작과 졸-겔법으로 p-type Cu<sub>2</sub>O를 형성하고 열처리과정을 통하여 안정한 Cu<sub>2</sub>O 박막제작이 가능하다는 것을 보여주었다.

### 1. 서론

ZnO has been studied as candidate materials for optical devices alternative to GaN. However, due to the difficulty in obtaining p-ZnO, the realization of the p-ZnO/n-ZnO homojunction based optical devices is difficult. Thus, many ultraviolet (UV) sensors have been prepared from p-n heterojunctions with n-ZnO using Si, GaN, NiO, and Cu<sub>2</sub>O as p-layers. Among them, the Cu<sub>2</sub>O has wide applications as a p-type semiconductor, including solar cell, electrochromic devices, and thin-film-transistors, and has bandgap of 2.1 eV at room temperature.

### 2. 본론

All-oxide UV photosensors based on Cu<sub>2</sub>O/ZnO heterostructure were fabricated on corning glass substrates. Here, the p-type Cu<sub>2</sub>O thin films were synthesized by sol-gel coating and electrodeposition based on solution process. The Cu<sub>2</sub>O layers were directly deposited on the ZnO nanowire arrays/AZO bottom electrode for the formation of p-n diode. The Cu<sub>2</sub>O thin films with p-type characteristics were successfully grown on ZnO nanowire arrays and annealing process was performed to improve surface uniformity. And, the Cu<sub>2</sub>O layers with two-dimensional shape were produced on the top of the ZnO nanowires after annealing process

### 3. 결론

This device showed good p-n diode curve and low dark current in reverse bias. The Cu<sub>2</sub>O/ZnO nanowire based sensors are highly sensible to UV illumination and exhibit improved photoresponsivity than the ZnO film based devices.

### 참고문헌

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