A Zinc Oxide Nanoparticles Photodetector

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Abstract

A zinc oxide (ZnO) nanoparticles photodetector was fabricated with a simple method. With 5V applied bias, it was found that dark current and photocurrent of our ZnO nanoparticles photodetectors were 1.98×10^-8 and 9.42×10^-7 A, respectively. In other words, we achieved a photocurrent to dark current contrast ratio of 48. With an incident light wavelength of 375 nm and a 5V applied bias, it was found that the measured responsivity were 3.75 A/W for the ZnO nanoparticles photodetector. On the other hand, the 3.75 A/W responsivity measured from the ZnO nanoparticles photodetector corresponds to detector efficiency significantly larger than 100%. Such a result indicates that there exists a large photoconductive gain in the ZnO nanoparticles photodetector.

KEYWORDS: ZnO, Nanoparticles, Transient response, UV Photodetector

The I-V curve of photo current and dark current.

The XRD spectrum of ZnO nanoparticles and Al2O3 substrate. (Annealing 800°C)

The SEM image of the ZnO nanoparticle on Al2O3 substrate after annealing at (a) 400°C, (b) 600°C, (c) 800°C.

The ranges of EDX spectrum detection in ZnO nanoparticles film.

Schematic diagram of the fabricated ZnO nanoparticles photodetector.

Room-temperature spectral responses of the ZnO nanoparticles photodetector measured with different applied biases.

Transient response of the measured current by turning the UV light on-and-off. (Annealing 800°C)