

ZnO 나노입자의 광전류 특성

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Photocurrent Characteristics of ZnO Nanoparticles

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Abstract : ZnO is one of the widely utilized n-type semiconducting oxide materials in the field of optoelectronic devices. For its application to the fabrication of promising ultraviolet (UV) photodetectors, ZnO with various structures has been extensively studied. However, study on the photodetectors using zero-dimensional (0-D) ZnO nanoparticle is scarce while the 0-D nanoparticle structure has many advantages compared to the other dimensional structures for absorption of light. In this study, the photocurrent characteristics of ZnO nanoparticles were investigated through a simply pasting of the nanoparticles across the pre-patterned electrodes. Then the photoluminescence (PL) characteristic, photocurrent response spectrum, photo- and dark-current and photoresponse spectrum were investigated with a He-Cd laser and an Xe lamp. An dominant PL peak of the ZnO nanoparticles was located at the wavelength of 380 nm under the illumination of 325-nm wavelength light. The ratio of photocurrent to dark current (on/off ratio) is as high as 10^6 which is considerable value for promising photodetectors. On the other hand, the time constants in photoresponse were relatively slow. The reasons of the high on/off ratio and relatively slow photoresponse characteristic will be discussed.

Key Words : UV photodetector, ZnO nanoparticle, Photoluminescence, On/off ratio, Photoresponse