

Development of n^+ -ZnO/ n -Si photodetector with wavelength-selective operation

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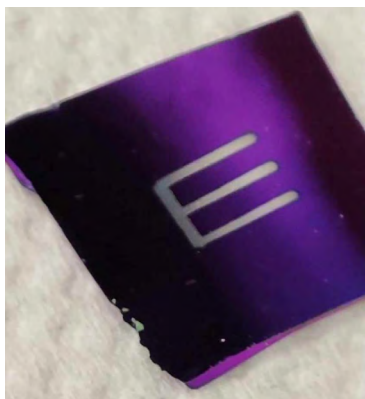


Figure 1: n^+ -ZnO/ n -Si photodiode

In this presentation we will discuss the development and operation of broadband n^+ -ZnO/ n -Si photodetectors. Three ZnO thin films were developed by Atomic Layer Deposition (ALD) on n -Si at three different temperatures (100 °C, 150 °C, and 200 °C), forming three different photodetecting devices.

Current-voltage measurements exhibit broadband photoresponse of the devices, across the UV-visible-NIR. The photodetectors are able to distinguish between UV-vis and NIR illumination by producing opposite photocurrents, demonstrating wavelength-selective operation. By utilizing pulsed light, the response times of the

photodetectors were investigated for different pulse frequencies and wavelengths. The devices show response times as low as 40 μ s at a pulse frequency of 400 Hz. The ZnO film developed at 150 °C exhibited the most promising results with a responsivity of 0.242 A/W and a detectivity of $42 \cdot 10^{12}$ Jones.