

A Lateral Photodetector Using a (310)-Oriented Pb_2CrO_5 Thin Film

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A Pb_2CrO_5 thin film lateral photodetector is described. The detector consists of a pair of Au planar electrodes on a (310)-oriented film surface with a micrometer-order spacing. An Au/ Pb_2CrO_5 contact allows for visible and near-ultraviolet irradiation and has the following advantageous photoelectric properties: (1) a high response speed (120 kHz), (2) a low dark current (2 pA at 40 V), and (3) a high ratio of photocurrent and dark current (2500 at 90 mW/cm²). The simplicity of fabrication, the planar lateral configuration, and the high film resistance indicate that the device can be used as an integrated solid-state detector in the visible and near-ultraviolet regions.

1. Introduction

The use of photodetectors with lateral structures on semi-insulating substrates is desirable for integrated optoelectronic circuits. Two kinds of lateral structures have been demonstrated: a lateral p-i-n structure^(1,2) and a lateral metal-semiconductor-metal (MSM) structure.^(3,4) Recently, more attention has been paid to the fabrication of MSM photodiodes because of the advantages they present for fabrication simplicity, reliability, and the absence of high-temperature diffusion processes. The double Schottky barrier configuration of the MSM photodiode⁽⁵⁾ is of special interest for materials in which a p-n junction cannot be formed.

Pb_2CrO_5 , in the system of PbO-chromium-oxide, was first found to be a dielectric material by Negas in 1968.⁽⁶⁾ Recently, photovoltaic and photoconductive effects