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LETTER

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A Pb_2CrO_5 Photovoltaic Device for Two-Dimensional Light Position Detection

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A planar Pb_2CrO_5 photovoltaic device is demonstrated for two-dimensional light position detection. The device is composed of four rectangular electrodes for signal detection and a meshlike divided electrode located at the center part, on the Pb_2CrO_5 ceramic substrate. The position signal arises from the difference of the photovoltages induced at Au–Pb_2CrO_5 Schottky contacts. The position detection characteristics are dependent on the slit size for a light beam. By optimizing the slit size, a high position resolution of 1.6 μm and a good linearity of ± 20 μm were obtained in the range of 0.95×0.95 mm^2.

A typical position-sensitive photodetector (PSD) is a semiconductor device using the lateral photoeffect to sense spatial information from an incident light beam.[1,2] The PSD has some advantages, including a higher position resolution than that of the charge-coupled device and a simple reading circuit.[3–6]

A two-dimensional tetralateral PSD as a prototype has a high position resolution. This PSD structure, however, includes a large position detection error. To reduce the position error, an improved electrode configuration was proposed.[4] However, a two-dimensional duolateral PSD suitable for accurate position detection is complicated in device structure and reading circuit and does not have a good position resolution, because of the requirement of two resistive layers.[5]

A photovoltaic effect was discovered in a Pb_2CrO_5 ceramic device with a pair of Au planar electrodes.[7] The purpose of this letter is to report a two-dimensional light position detector using a Pb_2CrO_5 ceramic substrate.

The Pb_2CrO_5 ceramic sample for the present study was prepared by sintering from mixed powders of 76 mol% PbO, 4 mol% CaO and 20 mol% Cr_2O_3 in air at