

### TAT Image Simulator for Flexible LCDs (LCD-ImgView)

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#### Background and Objective



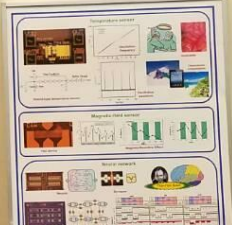
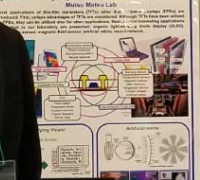
#### Basic Equations for LC Alignment

For TN, VA  
$$\frac{d^2\theta}{dz^2} + \frac{1}{2} \frac{d^2\theta}{dz^2} = 0$$

#### Optical Calculation



### Applications of TFT other than FPD = TFTのFPD以外の応用 =



### Hybrid-type Temperature Sensor using Thin-Film Transistors generating Rectangle Output Waveform - Operating Confirmation by Actual Experiment -

**Introduction**

This paper reports on the development of a hybrid-type temperature sensor using thin-film transistors (TFTs) that generates a rectangle output waveform. The sensor is composed of a TFT array and a temperature-sensitive layer. The output waveform is a rectangle whose width and height vary with temperature. The sensor is fabricated using a standard TFT process, and its characteristics are confirmed by actual experiments.

**Temperature dependence of transistor characteristics**

The temperature dependence of the threshold voltage ( $V_{th}$ ) and the transconductance ( $g_m$ ) of the TFTs is investigated. The results show that  $V_{th}$  increases and  $g_m$  decreases as the temperature increases. This is due to the increase in the carrier scattering rate and the decrease in the carrier mobility with increasing temperature.

**Hybrid-type temperature sensor**

The hybrid-type temperature sensor is fabricated by combining the TFT array and the temperature-sensitive layer. The sensor is operated at a constant gate voltage, and the output waveform is measured. The results show that the output waveform is a rectangle whose width and height vary with temperature. The sensor is confirmed to operate correctly by actual experiments.

### Evaluation of the Infrared-Ray Sensors using Poly-Si TFTs

**Abstract**

We have studied light and temperature dependence of transistor characteristics in n-type, p-type and amorphous poly-Si TFTs with and without infrared (IR) absorption. It is found that light and temperature dependence of the light absorption coefficient is the same and that IR is not much higher than that of the visible spectrum. Moreover, we confirmed that the light absorption with IR light absorption is not much larger than the temperature dependence. Based on these results, we proposed three detection forms by detecting area for the IR sensor using poly-Si TFTs.

**Introduction**

Infrared-ray sensors using TFTs have been studied for a long time. However, the light and temperature dependence of the light absorption coefficient is not clear. In this paper, we study the light and temperature dependence of the light absorption coefficient of the TFTs with and without IR absorption. It is found that light and temperature dependence of the light absorption coefficient is the same and that IR is not much higher than that of the visible spectrum. Moreover, we confirmed that the light absorption with IR light absorption is not much larger than the temperature dependence. Based on these results, we proposed three detection forms by detecting area for the IR sensor using poly-Si TFTs.

**Transistor Characteristics**

The characteristics of the TFTs are investigated. The results show that the threshold voltage ( $V_{th}$ ) and the transconductance ( $g_m$ ) of the TFTs are dependent on the light and temperature. This is due to the increase in the carrier scattering rate and the decrease in the carrier mobility with increasing temperature.

**Low Noise Amplifier using detection type IR Sensor**

The low noise amplifier using the detection type IR sensor is proposed. The amplifier is composed of a TFT array and a temperature-sensitive layer. The output waveform is a rectangle whose width and height vary with temperature. The amplifier is confirmed to operate correctly by actual experiments.