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## High Performance TFD Devices Using Plastic Film Substrate

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Because of good advantages (higher production yield, lower cost, and lower power consumption), TFD(thin film diode)-LCDs using flexible plastic substrate can be applied to the display for mobile communication. Using the TFD switching device, high quality moving picture can be displayed with low power consumption<sup>(1)</sup>. However, TFD devices on plastic substrate have some problems such as the *crack*, *distortion* and *blistering*.

In this study, we successfully fabricated high performance TFD devices on flexible plastic film substrate without any defects. For solution of these problems, we developed a new type of TFD structure with a stress buffer layer between flexible plastic substrate and rigid bottom electrode, and performed a low temperature annealing process (LTAP) below 150 °C in vacuum and O<sub>2</sub> ambient. As buffer layer, we used SiO<sub>2</sub> (500Å).

First, SiO<sub>2</sub> was deposited on 7 x 7 cm<sup>2</sup> plastic substrate at 110 °C for buffer layer. Bottom Ta electrode was deposited by sputtering method(2000Å) and patterned and Ta<sub>2</sub>O<sub>5</sub> insulation layer was fabricated by anodic oxidation on the bottom Ta electrode. The thickness of Ta<sub>2</sub>O<sub>5</sub> layer was linearly related to the final voltage with a proportionality constant of approximately 14.7Å/V at room temperature<sup>(2)</sup>. After anodic oxidation, Ti was deposited on top of the oxide layer and patterned(2000Å). Finally, TFD device was annealed at one time. The fabricated TFD device was characterized by measuring current-voltage (I-V) curve using HP 4145B analyzer.

We attempted a new type of TFD structure with buffer layer and successfully fabricated high performance TFD devices on flexible plastic substrate without any defects such as crack, distortion and blistering. We expect high performance TFD devices to be applied to the switching devices for mobile communication.

### [References]

1. R. Baeeuerle et al, "A MIM driven Display with Colour Filters on 2 diagonal Plastic Substrate" , SID 99 Digest, 143
2. M. J. Lee et al, "Effect of Postannealing on Current-Voltage Characteristics of MIM