

SINGLE LAYER FLEXIBLE DISPLAY AND METHOD OF MANUFACTURING THE SAME IITM Technology Available for Licensing

Problem Statement

- Existing technologies for display applications such as LCDs, OLEDs electrochromic displays, and QD displays are not cost-effective for a large variety of applications, especially when the switching frequency requirements are low.
- There is need for cost-effective solutions, involving touch sensors replacing the complex device fabrication and implementation with highly conducting layer for sensing, and transparency so that the display beneath can be visible

Intellectual Property

- IDF 2152
- IITM Ref. IN 435167(Granted)

Technology Category/ Market

Category – Advanced Material and Manufacturing Applications –Communication systems, Interactive displays, Electrical Appliances, Manufacturing, Automobile, Entertainment,

Industry–Manufacturing, Entertainment, Automobiles
Market -The global display market size was valued at \$114.9 billion in 2021, and is projected to reach \$216.3 billion by 2031, growing at a CAGR of 6.7% from 2022 to 2031.

Key Features / Value Proposition

❖ *Technical Perspective*

- Display and touch functionalities assigned to the same material layer** i.e.active layer
- The plurality of segments is electrically coupled to the plurality of conducting contacts to **provide desired display pattern (Eg:7-segment displays, matrix displays , complex pattern)** on application of electrical signal
- The touch display device is assigned **with display drive and touch sensing functionalities** according to **time-division multiplexing**

- Display device can hold its state for an **extended period of time without a voltage drive**, and thereby low power consuming
- ❖ *User Perspective:*
- Single-layer display device structure, and thereby **simple and easy to fabricate**.
- A wide variety of display configurations can be fabricated and implemented.**
- Display device are **mechanically flexible and in conformity with standard**

Technology

- ❑ The present invention relates to a **single layer flexible display device (Fig.1a)** and method of manufacturing the display device

A single layer flexible display device includes:

a substrate

a plurality of conducting contacts

an active layer

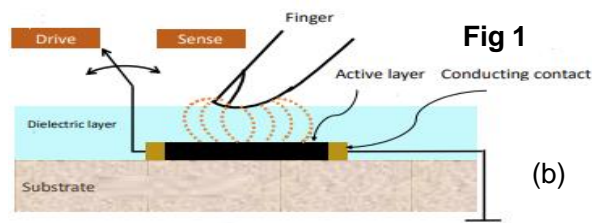
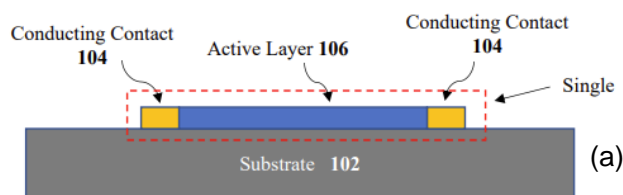


Fig 1

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IITM TTO Website:
<https://ipm.icsr.in/ipm/>

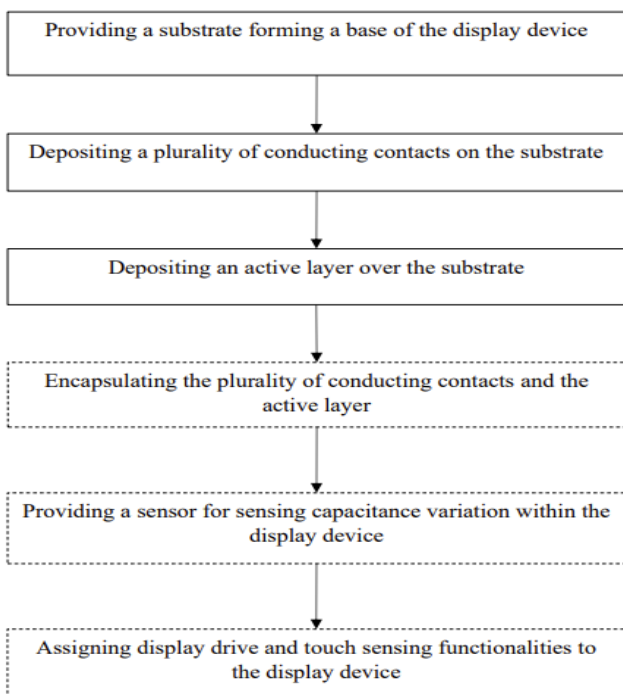
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- ❑ The single layer flexible display device, may have touch functionality incorporated in it., Fig.1(b).
- ❑ A touch display device has :
 - ✓ a transparent dielectric layer deposited over the active layer and
 - ✓ a sensor coupled with the active layer configured to sense capacitance variation
- ❑ The transparent encapsulation layer encapsulates the plurality of conducting contacts and the active layer
- ❑ The sensor senses the capacitance of a capacitor formed within the display device, by at least one segment of the plurality of segments, the transparent encapsulation layer, and user's finger
- ❑ One segment of the plurality of segments acts as a first capacitor plate, the transparent encapsulation layer act as dielectric, and the user's finger acts as a second plate of capacitor

Method of manufacturing the display device involves the following steps:



Image

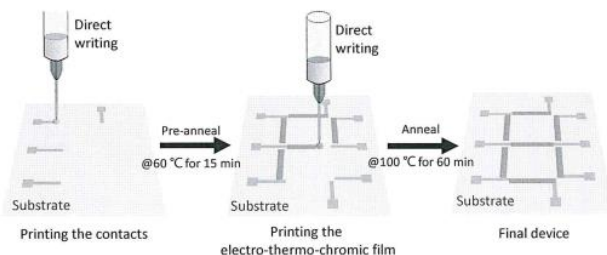


Fig 2. The fabrication of a seven-segment display is shown with **contacts and segments are patterned by direct writing** followed by low temperature annealing

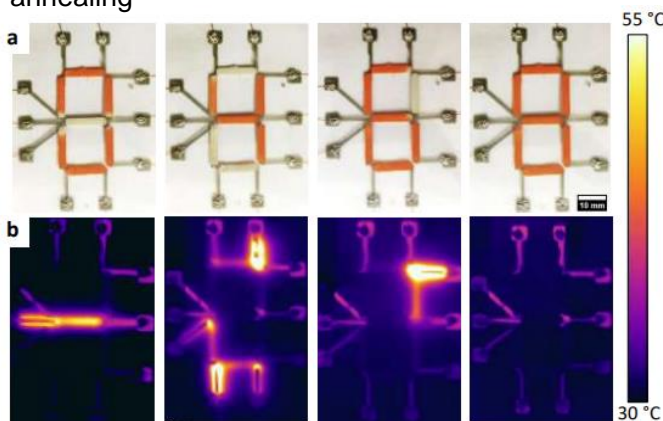


Fig. 2 illustrates exemplary **seven-segment display structure of a display device**, whereby the said display with numbers '0', '4', '6', '8', are displayed

The segment that turned on appears decoloured and hence appear as white with increased temperature

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TRL (Technology Readiness Level)

TRL-3 Experimental proof of concept

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