

Rollable, foldable and stretchable displays

Gerwin Gelinck¹

¹Holst Centre, High Tech Campus 31, 5656 AE Eindhoven, Eindhoven, The Netherlands
Tel.:31-40 40 20 448, E-mail: gerwin.gelinck@tmo.nl

The Holst Centre in The Netherlands was founded in 2006 as a partnership between academia, industry, and government to collaborate on the development of a new generation of electronics that are flexible, lightweight, low power, and rugged using materials and processes that are economical for mass-production. In this presentation we will focus on exploring ultrathin and stretchable displays.

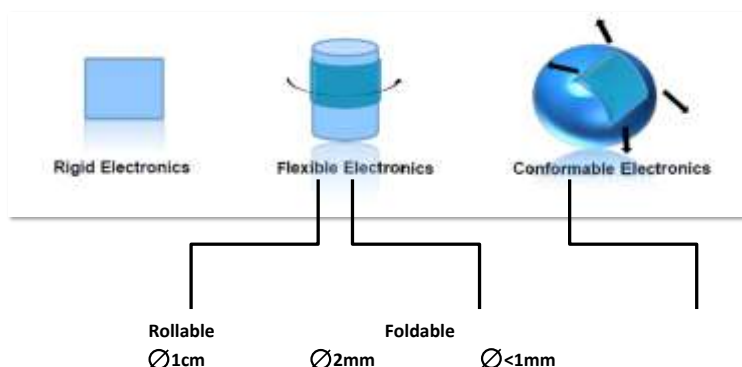


Fig. 1. Holst Centre's roadmap from rigid to 1D-flexible and 2-D conformable (stretchable) displays.

To make lightweight, unbreakable, portable displays, thin plastic substrates are preferred as they give maximum mechanical flexibility. In comparison to liquid crystal (LC) displays, flexible active matrix organic light emitting diode (AMOLED) displays offer superior optical image quality, particularly when flexed. However, the emergence of ultra-flexible AMOLED displays bring new technological requirements, including the demand for ultrathin, high-quality thin-film barriers to protect the OLED from moisture ingress, the need for a TFT backplane that is sufficiently reliable upon bending and preferably does not change its electrical performance when mechanically strained, and ultimately the integration of the components mentioned above on ultrathin plastic substrates that can be temporarily bonded on a rigid glass carrier. Current status will be discussed (Fig. 2)

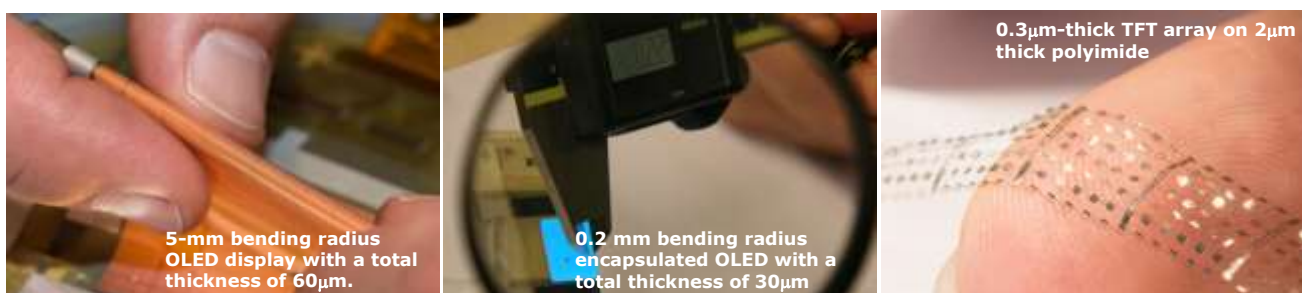


Fig. 2. Illustration of ultrathin displays, OLEDs and oxide TFTs made at Holst Centre.

Finally, with textile integration in mind, we will present a strategy to realize stretchable displays using LEDs instead of OLED pixels. Stretchability is achieved by laser machining open structures in the thin plastic substrate, so that rigid functional pixel islands are separated by conducting meanders that act as springs. Passive as well as active stretchable displays will be demonstrated.