

Flexible Electronics

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In view of the tremendous technical challenges for realizing next-generation information technology, organic semiconductors have attracted significant attention since the emerging electronics based on them have features that are complimentary to main stream electronics based on silicon. Thanks to the recent advent of organic transistors, the emergence of a new class of electronics makes full use of the unique features of organic semiconductors, such as the ultralow cost, low weight, and flexibility, is becoming more realistic. With this background, our group discerned that large-area circuits could be easily fabricated using organic transistors, which are essential for certain applications, and has developed large-area sensors and actuators using organic transistors. More accurately, we have integrated various types of sheet-type sensors and sheet-type actuators with organic transistors on plastic films and have demonstrated the world's first electronic artificial skins (Eskins), sheet-type Braille displays, and many other sheet-type devices.

In the forthcoming ambient electronics era, multiple electronic objects are scattered on walls, ceilings or in imaginative locations and interact each other to enhance safety, security and convenience. For implementation of many electronic objects in our daily life, large-area sheet-type devices are needed and organic transistors are expected to play an important role.

In this presentation, I will describe recent progress and future prospects of organic transistor-based flexible, large-area sensors and actuators [1-4]. Moreover, the issues and the future prospect of organic transistors will be addressed from the view point of ambient electronics.

[1] T. Someya, et. al., PNAS 101, 9966 (2004); PNAS 102 (35) (2005). [2] T. Someya, et. al., IEEE T-ED 52, 2502 (2005). [3] Y. Kato, et. al., IEEE T-ED 54, 202 (2007). [4] T. Sekitani, et al., Nature Materials 6, 413 (2007).

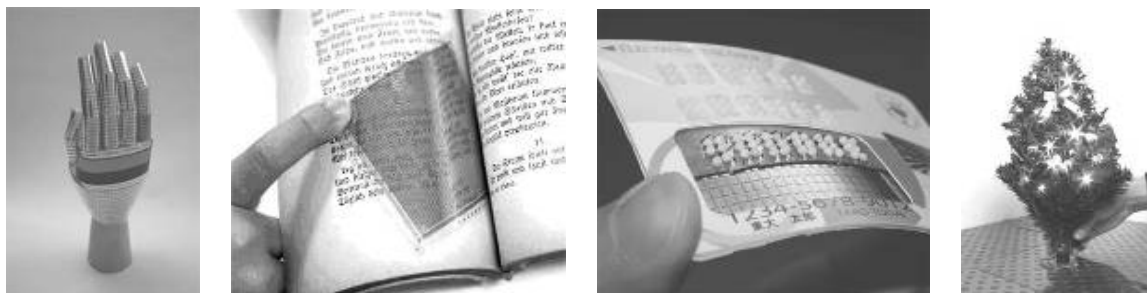


Figure: Images of unique large-area, flexible electronics devices using organic transistors; an Eskin, a pocket scanner, a Braille e-paper, and a power sheet.