Ambient Electronics and Digital Fabrication: Print Electronics Everywhere!

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Abstract

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 (E-skins), 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, which would be printed on plastic sheet, cloth, and/or paper, are expected to play an important role. In this talk, I will describe recent progress and future prospects of organic transistor-based flexible, large-area sensors and actuators. Moreover, the issues and the future prospect of digital fabrication will be addressed from the view point of ambient electronics.

Biography

Takao Someya received his PhD in electrical engineering from the University of Tokyo (1997). Since 2009, he has been a professor of Department of Electrical and Electronic Engineering, The University of Tokyo. From 2001 to 2003, he worked at the Nanocenter (NSEC) of Columbia University and Bell Labs, Lucent Technologies, as a Visiting Scholar. His current research interests include organic transistors, flexible electronics, plastic integrated circuits, large-area sensors, and plastic actuators. Prof. Someya has received a number of awards including a Japan Society for the Promotion of Science (JSPS) Prize, the 1st Prize of the newly established German Innovation Award, and 2004 IEEE/ISSCC Sugano Award. He is a member of the board of directors of the U.S. Materials Research Society since 2008 and an IEEE/EDS Distinguished Lecturer. Prof. Someya's " large-area sensor array" electronic thin film was featured in Time Magazine as one of its "Best Inventions of 2005" in its November 21st issue.