

**Stretchable Large-Area Integrated Circuits by Nano-Printing Technology**

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**【Outline of survey】**

There has been growing interest in organic transistors, because these emerging devices have several advantages over existing devices based on roll-to-roll and/or printing processes.

In this project, we will exploit the nano-printing technology to realize stretchable large-area integrated circuits.

First, we will establish a novel nano-printing technology with combining atto-liter inkjet and self-assembled monolayer. We will realize interconnections for organic transistors by stretchable conductors using carbon nanotube. In these approaches, we will realize stretchable large-area integrated circuits that can be applied on the curved surface like rubbery.

Second, we will apply conductive rubbers or conductive gels to stretchable integrated circuits. We will study fundamental physics and interfacial physics of these stretchable electric materials and devices, and build up the basic of new field as stretchable electronics.

**【Expected results】**

In the forthcoming ubiquitous electronics in the next generations, large-area sheet-type devices will play an important role. In this project, we will miniaturize organic transistors in the real nanometer regime by using printing process, and we realize high-performance, large-area organic transistor. We will also reveal the fundamental physics and interfacial physics of the stretchable electric materials and devices to build up the new field as stretchable electronics.

**【References by the principal investigator】**

Tsuyoshi Sekitani, Yoshiaki Noguchi, Ute Zschieschang, Hagen Klauk, and Takao Someya, "Organic transistors manufactured using inkjet technology with subfemtoliter accuracy", Proceedings of the National Academy of Sciences of the United States of America, Vol. 105, Issue 13, pp. 4976–4980 (Online March 24, 2008; April 1, 2008).

Takao Someya, Yusaku Kato, Tsuyoshi Sekitani, Shingo Iba, Yoshiaki Noguchi, Yousuke Murase, Hiroshi Kawaguchi, and Takayasu Sakurai, "Conformable, flexible, large-area networks of pressure and thermal sensors with organic transistor active matrixes", Proceedings of the National Academy of Sciences of the United States of America, Vol. 102, Issue 35, pp.12321-12325 (2005).

Takao Someya, Tsuyoshi Sekitani, Shingo Iba, Yusaku Kato, Hiroshi Kawaguchi, and Takayasu Sakurai, "A large-area, flexible pressure sensor matrix with organic field-effect transistors for artificial skin applications", Proceedings of the National Academy of Sciences of the United States of America, Vol. 101, Issue 27, pp. 9966-9970 (July 6, 2004).

**【Term of project】** FY2008—2012

**【Budget allocation】**

**73,100,000 yen** (direct cost)

**【Homepage address】**

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