【Grant-in-Aid for Scientific Research (S)】

Science and Engineering (Engineering)

Title of Project : Evaluation of Drug Response by Elastic Multipoint Electrode Array Using Cardiomyocyte Sheet

Takao Someya
(The University of Tokyo, School of Engineering, Professor)

Research Project Number : 17H06149 Researcher Number : 90292755
Research Area : Electrical and electronics engineering
Keyword : Electronic device and integrated circuit

【Purpose and Background of the Research】

In recent years, stretchable electronics has attracted much attention because it is expected that stretchy and soft electronic materials can improve significantly compatibility with living organisms. Recently, the authors succeeded in realizing high performance organic devices on ultrathin polymer film with a thickness of 1 micrometer. Ultrathin films can be attached to follow complicated surface shapes like living bodies. Indeed, this device was attached to a complex surface of a living body surface such as animal's heart, lungs, and skin, and biological information was monitored. In this research, we aim to apply stretchable electronics to the evaluation of drug reaction.

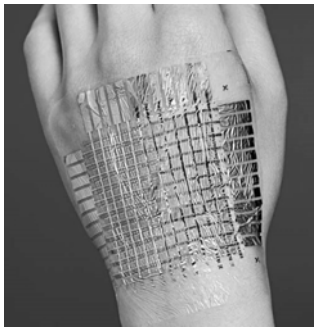

Figure 1: An organic device

【Research Methods】

We have established techniques for producing highly stretchable electronic components on various soft materials such as ultrathin polymer films, rubber sheets, fabrics and so on. In this research, we improve the durability of stretchable devices while maintaining softness.

We evaluate durability of the devices quantitatively while maintaining softness. In particular, we will consider not only the materials themselves but also improve the durability from the viewpoint of the manufacturing process. After that, electrical measurements on myocardial cells are advanced, and the quality of biomedical signals is increased.

【Expected Research Achievements and Scientific Significance】

In this research, we will deepen understanding of science of biointerface where living body and stretchable electronics contact. In the biointerface whose compatibility with the living body is markedly improved by softness, it is expected that the biological signal can be measured stably over a long period of time. By promoting research based on this high stability and reliability as a strength, a biointerface has established a method for highly efficiently converting biological signals by various media such as electrons, ions, chemical substances into electric signals of electronics, Great development is expected for electronics and its application to drug response evaluation.

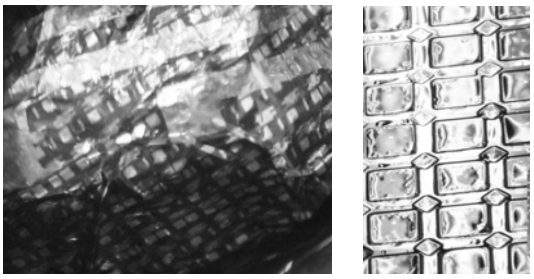

Figure 2: An organic device attached on a rat's heart

【Publications Relevant to the Project】

・Sungwon Lee, Takao Someya, et al., Nature Nanotechnology, vol. 11, pp.472–478 (2016).
・Martin Kaltenbrunner, Takao Someya, et al., Nature, vol. 499, pp.458-463 (2013).

【Term of Project】 FY2017-2021

【Budget Allocation】 157,100 Thousand Yen

【Homepage Address and Other Contact Information】

http://www.ntech.t.u-tokyo.ac.jp/
someya-sec@ee.t.u-tokyo.ac.jp