

1. Abstract

- New electronic functional ink which exhibits high conductivity and mechanical durability while being printed on textile have been developed.
- The printed conductors by using the new ink realizes a conductivity of 182Scm^{-1} at a strain of 215%, which is currently the highest value reported for stretchable conductors that can be stretched $> 150\%$.

2. Highly Stretchable Elastic Conductors

2-1 Fabrication Process of elastic conductor ink

Ag flakes

Fluorine rubber (DAIKIN Daiel-G801)

$$\left(\text{C} \begin{matrix} \text{H}_2 \\ \text{F}_2 \end{matrix} \right)_m \left(\text{C} \begin{matrix} \text{F} \\ \text{F}_2 \\ \text{CF}_3 \end{matrix} \right)_n$$

4-methyl-2-pentanone

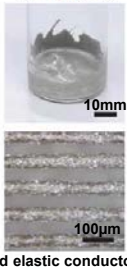
$$\text{H}_3\text{C}-\text{C}(\text{CH}_3)=\text{C}(\text{O})-\text{CH}_2-\text{CH}_3$$

Surfactant (Zonyl FS-300)

$$\left(\text{F} \begin{matrix} \text{F} \\ \text{F} \end{matrix} \right)_x \left(\text{F} \begin{matrix} \text{F} \\ \text{F} \end{matrix} \right)_y$$


Stir for 12 h

Elastic conductor ink

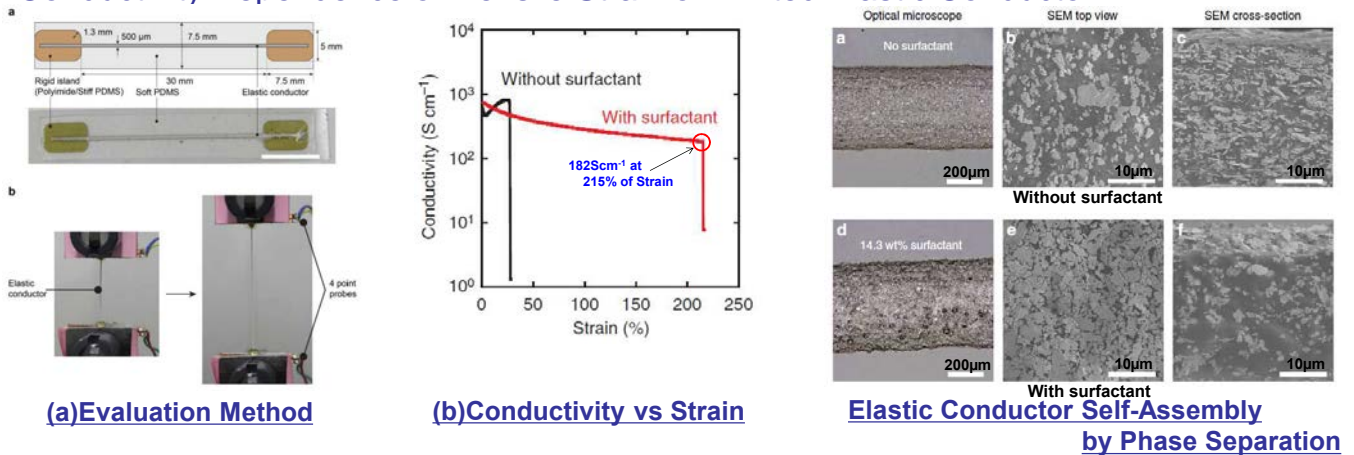


Printed elastic conductor

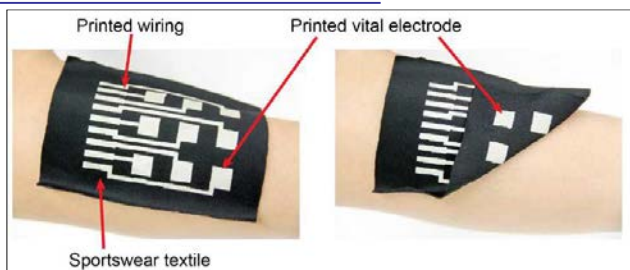
- The elastic conductor ink is prepared by adding Ag flakes as conductive fillers to an elastomeric fluorine copolymer with 4-methyl-2-pentanone as an organic solvent, together with a water-based fluorine surfactant.
- The conductor ink can be readily printed with conventional printing techniques such as stencil printing or dispensers.



2-2 Conductivity Dependence on Tensile Strain of Printed Elastic Conductor



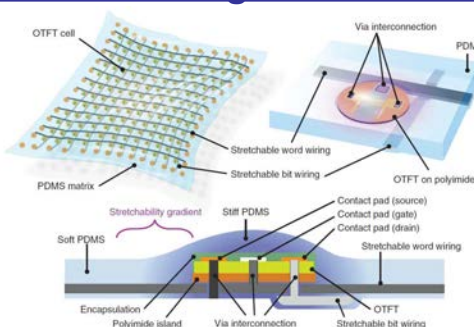
3. As Wearable Sensor



A Muscle Activity Sensor Fabricated on Sportswear Material

- Electrode, wires, and via holes can be printed by a single step printing process. The muscle activity sensor was fabricated combining with an organic transistor amplifier circuit.

4. As Stretchable Organic Transistor Active Matrix



Trialed Sample of 12x12 Active Matrix



Patent Licensing Available

Patent: WO2015/119217
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