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Printable stretchable electrodes based on silver nanowires

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Silver nanowires (AgNWs) have attainedmyriad performances due totheir structure of the high aspect ratio and twin crystal. A transparent electrode based on aAgNWs network is one of candidates for an alternative to tin-doped indium oxide (ITO). Although ITO have been widely used in displays, touch screens, and solar cells, there are limitation of supply and brittleness. The AgNWs transparent electrode shows high flexibility in addition to comparably optical transmittance and electrical resistance of an ITO film. This can pave the way for future flexible and wearable electronics which can be bent, stretched, compressed, and twisted to arbitrary shape.Moreover, simple solution preparation of AgNWs, so-called polyol methods, have a possibility resulting into high throughput roll-to-roll process which is a printing technique of creating electronic devices on flexible plastic or metal foils. Here, ultra-long AgNWs were synthesized by modifying polyol method to improve the transmission haze and optical transmittance of the transparent electrode. A transparent electrode based on the ultra-long AgNWs achieved an electrical sheet resistance of 1×10^2 Ω/□, and low transmission haze of 2.6% with a high parallel optical transmittance of 95%. Patterning large/small area of stretchable/ transparent electrode will also be presented.

Biography:

Teppei Araki received his Ph.D. in engineering from Osaka University at September 2014 under supervision of Prof. Katsuaki Suganuma for “printable wiring technology for stretchable electronics”. He was a JSPS Fellows and studied at Holst Centre in the Netherland for a year during doctoral program He works as an assistant professor of Osaka University from October 2014 and engages in “flexible electronics and photonics” supervised by Prof. Tsuyoshi Sekitani.

Tsuyoshi Sekitani received the B.S. degree from Osaka University, Japan in 1999, and the Ph.D. degree in applied physics from the University of Tokyo, Japan in 2003. From 1999 to 2003, he was with the Institute for Solid State Physics, the University of Tokyo. From 2003 to 2010, he was a Research Associate, and in 2011, he was an Associate Professor in the School of Engineering at the University of Tokyo. In 2014, he was made a Professor in The Institute of Scientific and Industrial Research at Osaka University. His current research interests include organic transistors, flexible electronics, plastic integrated circuits, large-area sensors, and plastic actuators.