

Scientists develop cuttable display sheets

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Figure: Display sheet being cut with scissors (left). The sheet's display function is intact even after being cut into smaller pieces (right). Credit: National Institute for Materials Science

A research group led by Masayoshi Higuchi, the leader of the Electronic Functional Macromolecules Group, Research Center for Functional Materials, NIMS, developed new display sheets that can be cut into any shape with scissors. As you can cut this display into any shape you like, and attach it on the surfaces of things that has complex shapes such as clothing and buildings, the display is expected to meet diverse display needs, which cannot be achieved by conventional display technologies.

Common displays (including LCD and OEL) that are capable of showing letters and images are equipped in most of the electronic devices we use in our everyday life. Also, there are increase in demand for displays that



can present information in a variety of forms, such as digital signage and wearable devices. However, it is impossible to cut these conventional displays into various shapes because it is necessary to seal the contents of both LCDs and OELs, for example, as the LCDs contain liquid and OELs are susceptible to water, oxygen and other impurities. Moreover, since these displays require continuous <u>power supply</u> to maintain their functions, they must be connected with a power source or a drive. Due to these requirements, it had been difficult to develop cuttable displays using existing technologies.

The research group developed display sheets that can be cut into any shape with scissors, using a polymer with electrochromic properties (organic/metal hybrid polymer). This polymer can be sprayed onto a flexible substrate to form a coating layer stable against moisture and oxygen. In addition, the new display requires only a few seconds of electrical input to switch visual information, and the display will last even after power supply is discontinued. Accordingly, we successfully developed a sheet type display device capable of functioning while being detached from a <u>power source</u> and after being cut into a shape.

In future studies, we aim to increase the display area and make it capable of showing multicolor. We also intend to propose a concept called "new life style in which people can enjoy changeable colors in everything." In this proposal, we envision the application of the new technology in society whereby people can freely change the colors of various objects/items, e.g. windows, the interior or exterior of motor vehicles and buildings, umbrellas and sunglasses, and can <u>display</u> letters and symbols as appropriate.

This study was conducted under the project "Ultrafast, ultralow-power, ultralarge-area electrochromism" (Masayoshi Higuchi, Research Director) in the research area "Innovative nano-electronics through interdisciplinary collaboration among material, device and system layers"



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