

Conductive polymer-based electrochromic soft contact lens

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Combining biocompatible, flexible, conducting polymers with hydrogels is highly attractive for future biomedical devices, including implanted electronics and wearable electronics. Previously, we have succeeded a printing of conductive polymer on hydrogels¹ and a bonding of metals/hydrogels² with electrochemical polymerization of conductive polymer. Here, we develop a conductive polymer-based electrochromic soft contact lens to block a sun light or widen eye's iris. To this end, we fabricate first a PEDOT/PSS film including polyurethane, ethylene glycol and dodecyl benzenesulfonic acid with spin coating. After that, we cut the conductive films: one is circular film and the other is ring film. Both films are mounted on commercial available soft contact lens with electrochemical polymerization. Such electrochemical bonding provides good adhesion even we wash the lens with my forefinger. When we applied a positive voltage to the film, the film is doped electrochemically and change a color from transparency to dark blue. In contrast, when applying a negative voltage, we observe an original transparency. This reversible behavior can be observed during several repeated cycles. The deepness of film color depends on the applied potential and the thickness of films (see Fig.1). In my presentation, I will discuss the detail about experimental results.

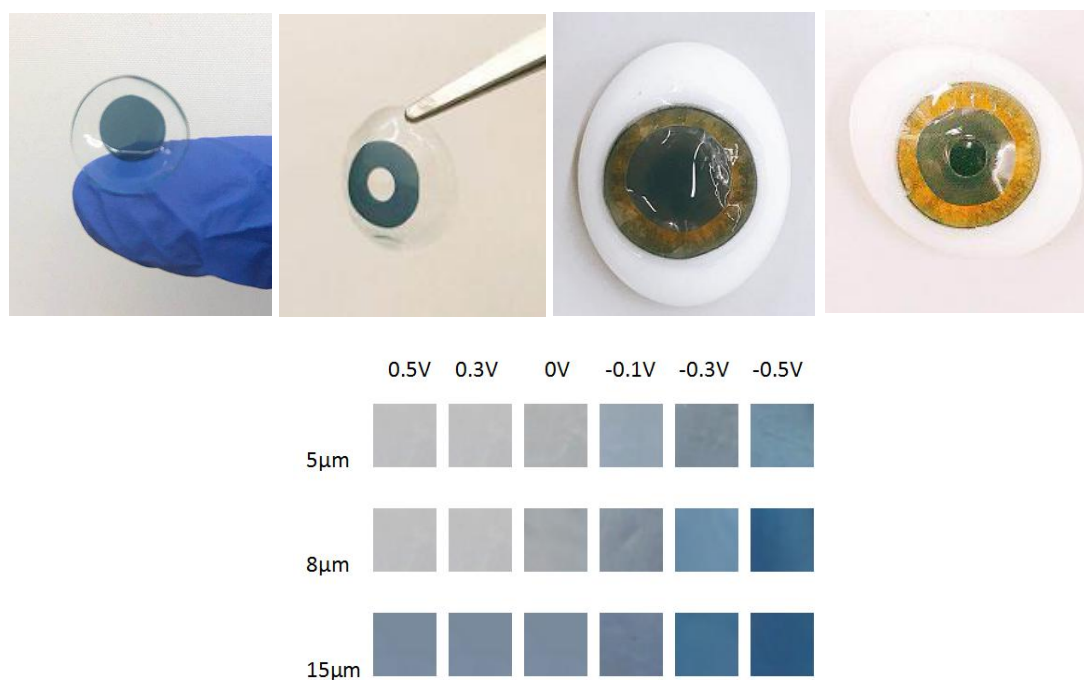


Figure1. Conductive polymer-based electrochromic soft contact lens

Reference

- [1] S. Sekine, et.al, J. Am. Chem. Soc., 132, 13174-13175 (2010).
- [2] Y. Ido, et.al, ACS Macro Letters, 1, 400-403 (2012).