
Integrated biodevices for smart contact lenses

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Smart contact lenses—contact lenses with built-in electronics—are a next-generation wearable product with capabilities beyond simple vision correction. Since the electrical lenses are in continuous contact with the eyeball surface, they have three main applications: (i) biomedical sensing of tears and intraocular pressure to monitor health conditions, (ii) wearable displays for augmented reality (AR), and (iii) actively regulating eye accommodation to ensure perfect vision. Thus, a smart contact lens has substantially greater functionality than an electrical eyeglass. We have developed several prototypes of an ultrasensitive diagnostic smart contact lens [1-5] with high sensitive biosensors and high efficient parity-time (PT) symmetric wireless transfer systems, a wireless electrochromic lens using conductive polymer-based film, and multi-electrode electroretinogram (ERG) lens system. I will present a detail in my invited talk.

- [1] T. Takamatsu et al, *Adv. Mater. Technol*, 8, 2201704, 2023.
- [2] S. Azhari et al, *IEEE Sensors Journal*, 23, 7902-7909, 2023.
- [3] L.Hu et al, *Sensors and Actuators A: Physical*, 344, 113766, 2022.
- [4] T. Takamatsu et al., *Adv. Funct. Mater.*, 30, 29, 2020.
- [5] T. Takamatsu et al., *Adv. Mater. Thechnol.*, 4, 5, 2019.



Short Bio:

Takeo Miyake received his PhD degree in Nanoscience and Nanoengineering from Waseda University, Japan. He is a professor of Graduate School of Information, Production and Systems at Waseda University, and Senior Science and Technology Policy Fellow, Secretariat for Science Technology and Innovation, Cabinet Office, Government of Japan.

