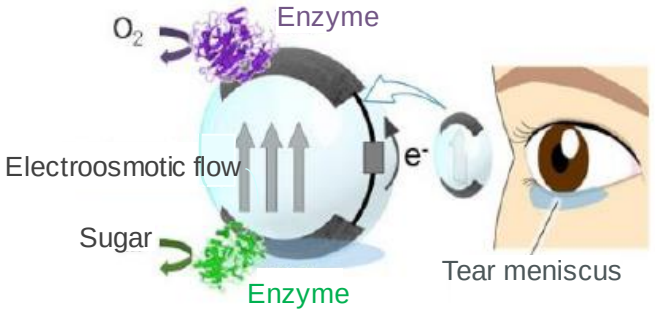
Tohoku Univ. Technology

Electrically moisturized contact lenses

Equipped with bio-battery, electroosmotic flow provides moisturizing effect



Overview

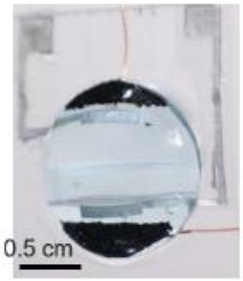
With the spread of contact lenses (CLs), the number of patients suffering from dry eye is increasing. In addition, the spread of smart CLs with biomonitoring, communication and display functions is expected in the future, and effective measures against dry eye are required.

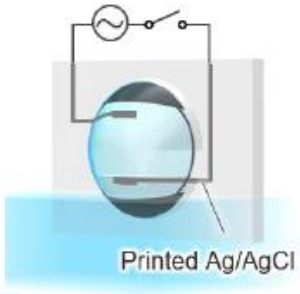
The present inventors have developed a CL-type device capable of preventing dry eye based on their long accumulated "hydrogel synthesis and molding technology" and "biocompatible battery power generation technology". Specifically, they developed a hydrogel material with high electroosmotic flow generation efficiency and excellent moldability. They found that when applied to CLs, water flow is generated in the lens by energization, which can maintain the wet state of the CL and stabilize the tear film on the cornea. Furthermore, they have succeeded in mounting a bio-battery on a contact lens to drive it as a self-standing device that does not require external power supply (right figure).

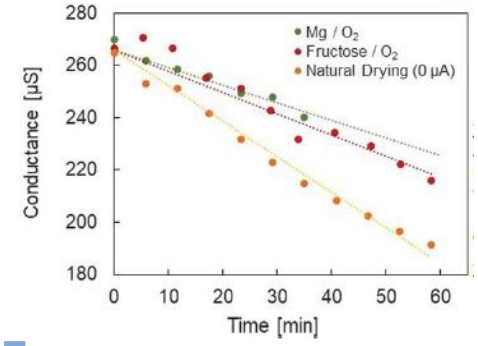
The present invention is important not only for the prevention of dry eye, but also for the controlled release of eyedrops and the control of intraocular pressure by inducing aqueous humor drainage.

It is expected to develop as a method for injecting and injecting eyedrops into and out of eye holes, which is similar to eye drops and syringes.

Drying suppression in Freestanding device







Compared with natural drying (●), the present invention (●, ●) maintains high conductance (=low resistance). This indicates the moisturizing effect of the present invention.

Product Application

- Contact lens having dry eye relieving function
- Application to medical devices (controlled release of eye drops and intraocular pressure control)
- Smart contact lens

Related Works

[1] S. Kusama, M. Nishizawa, Advanced Materials Technology, 5 (2020) 1900889.
[2] Tohoku University Press Release
https://www.tohoku.ac.jp/japanese/2019/11/press20191129-02-contact.html

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IP No.	:	JP7352979, GB・FR3936091, DE602019033310.2
Inventor	:	NISHIZAWA Matsuhiko, YOSHIDA Shotaro, KUSAMA Shinya
Admin No.	:	T18-478

Contact

Tohoku Techno Arch Co., Ltd.
Please visit CONTACT here