FocusSystems Corporation
The University of Tsukuba
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Moving forward with research development of “tertiary batteries” for the future of "battery-free IoT devices"

- A patent application and verification tests of a next-generation power supply bringing us closer to a carbon-neutral society -

Focus Systems Corporation (based in Shinagawa, Tokyo; CEO: Keiichi Mori) and the University of Tsukuba (based in Tsukuba city, Ibaragi prefecture; President: Kyosuke Nagata; Research representative: Yutaka Moritomo, professor of materials science and engineering) applied for a patent*2 based on their joint research on tertiary batteries*1, identifying the optimum substance for electrodes and continuously obtaining a stable voltage by using the specific substance for the electrodes.

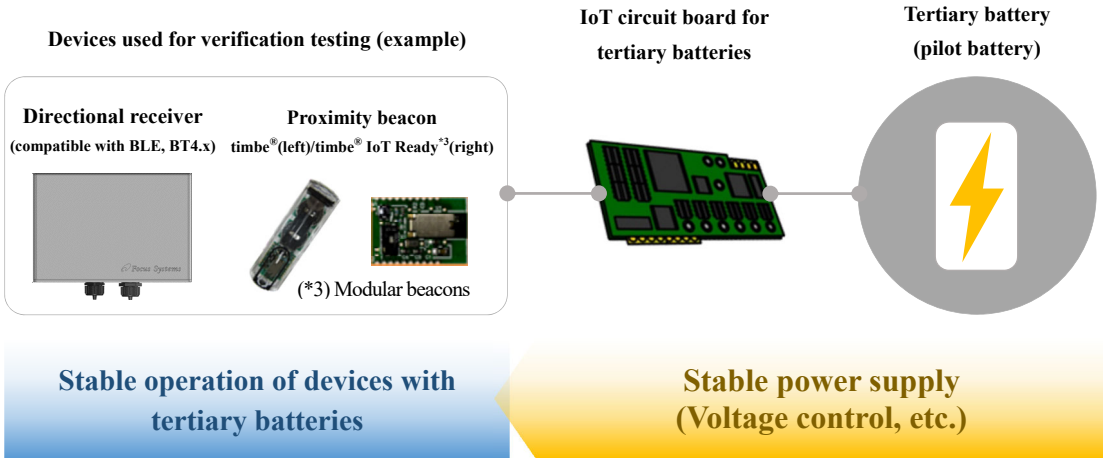
In the future, Focus Systems aims to develop core technologies that are available for all digital devices, furthering initiative on implementation of tertiary batteries, such as verification testing on running IoT devices powered by tertiary batteries.

(*1) A tertiary battery is charged by environmental heat, using the difference in the thermal coefficient of redox potential between the positive and negative electrodes.
A rechargeable battery is charged by electric power, as opposed to a tertiary batter which is charged by environmental heat.
(*2) "Tertiary battery, IoT device" (application number: 2021-057972 [dated: March 30, 2021])

Initiatives/verification tests for implementing tertiary batteries

[Example] To keep Focus Systems’ IoT products (e.g. proximity beacons/directional receivers) running stably:

1) Develop IoT circuit boards dedicated to tertiary batteries to connect to a tertiary battery (pilot battery).
2) Demonstrate a proof of concept that tertiary batteries can be electromotive forces using Focus Systems IoT products.



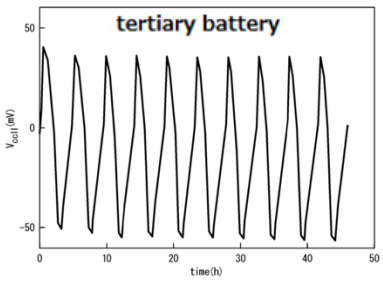
<Device configuration image for verification testing>

With the rapid progression of digitalization and Society 5.0 brought by 5G technology, there is a growing

demand worldwide for businesses who are simultaneously environmentally conscious. From a medium and long-term perspective, Focus Systems is committed to contributing to the development of a sustainable and carbon-neutral society, making full use of its knowledge and technologies to implement tertiary batteries that are expected to become ever more innovative electromotive forces in the field of energy harvesting.

■ Voltage measurement results associated with the thermal cycle characteristics of tertiary batteries

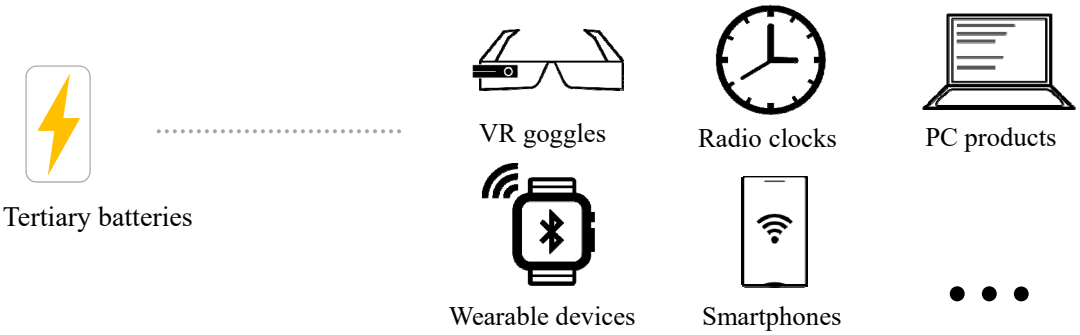
(an excerpt of the patent application)



Voltage obtained by the principle of tertiary batteries

Due to the thermal cycle characteristics associated with the rise and fall of temperature, a stable voltage was repeatedly obtained.

■ Examples of digital devices that can be expected to make use of tertiary batteries



■Related releases

- The University of Tsukuba and Focus Systems started their joint research on implementation of tertiary batteries (on March 26, 2019).
  https://www.focus-s.com/focus-s/media/190326.pdf
- They succeeded in increasing the voltage of a tertiary battery by using a phased-transition material (on February 6, 2020).
  https://www.focus-s.com/focus-s/media/200206.pdf

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