

University of Tsukuba and Focus Systems Initiate “tertiary battery” Joint Research**Development of a Safe, Low-Cost, Innovative Battery with Power Generation Function**

University of Tsukuba (Tsukuba City, Ibaraki Prefecture. President: Kyosuke Nagata) and Focus Systems Corporation (Shinagawa-ku, Tokyo. President and Representative Director: Keiichi Mori) are launching a joint basic-research project aimed at the realization of a “tertiary battery” equipped with a power generation function driven by changes in ambient temperature.

This innovative “tertiary battery” has a power generation mechanism that exploits temperature fluctuations (28 to 50 degrees Celsius) in its normal environment. This new technology can help resolve the environmental issues associated with the replacement and disposal of conventional single-use and rechargeable battery types.

The tertiary battery, once realized, will be utilized in addressing the future proliferation of IoT devices and other small-format electronic devices, thus enable the development of eco-friendly, low-cost IoT systems with battery replacement requirements reduced to a minimum.

This technological dream marks a cornerstone in establishing the concept of “energy harvesting*” as a social principle.

* Technology aimed at converting and utilizing power derived from energy present in users’ everyday environments.

tertiary battery explained

Secondary batteries such as lithium ion batteries can be used any number of times if they are charged with electrical energy. University of Tsukuba has proposed and promotes the research and development of a “tertiary battery” that can be charged using environmental heat instead of electrical energy.

In their joint research, University of Tsukuba and Focus Systems have developed a material that generates 10mV/K of thermo-electromotive force. It is intended to evaluate the material’s performance in coin cells.

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Attachment

1. Cost comparison of primary and secondary battery with tertiary battery

	Conventional primary and secondary batteries	tertiary battery
Initial cost	<ul style="list-style-type: none">• System design with consideration of battery life• Appropriate procurement of a new battery• Setting of the new battery into the IoT device• Initial setting of the IoT device	<ul style="list-style-type: none">• Procurement of a tertiary battery• Setting of the tertiary battery into the IoT device• Initial setting of the IoT device
Operating cost	<ul style="list-style-type: none">• Replacement plan according to battery life span and residual lifetime• Proper procurement and charge plan for a new battery• Battery exchange of the IoT device• IoT device resetting after the battery exchange• Disposal of the used-up battery	<ul style="list-style-type: none">• Exchange in case of battery breakdown

2. Outlook

Focus Systems Corporation was founded in 1977 and has been involved in the development and operation of public, telecommunications and information security systems that are an intrinsic part of society. Moreover, in IoT applications Focus Systems owns a successful track record in the development of in-house manufactured beacons and their associated systems. The objective of this joint research with University of Tsukuba is to realize a tertiary battery of superior efficiency. By combining the resources of University of Tsukuba with an IT perspective grounded in the aggregated technology and know-how of Focus Systems, the intention is to tackle public issues through IT technology including the development of tertiary battery-powered, eco-friendly systems.