



NGK INSULATORS

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Innolux Japan CO., Ltd.  
ENJI Corporation  
Cold storage Japan Inc.  
NGK INSULATORS, LTD.

## **Inolux Japan, ENJI, Cold storage Japan, and NGK** **start Development of Temperature and Humidity Control** **Service Using Sensor Tags for Transporting Wine**

### **Temperature and Humidity Control and Quality Visualization from Winery to Sales**

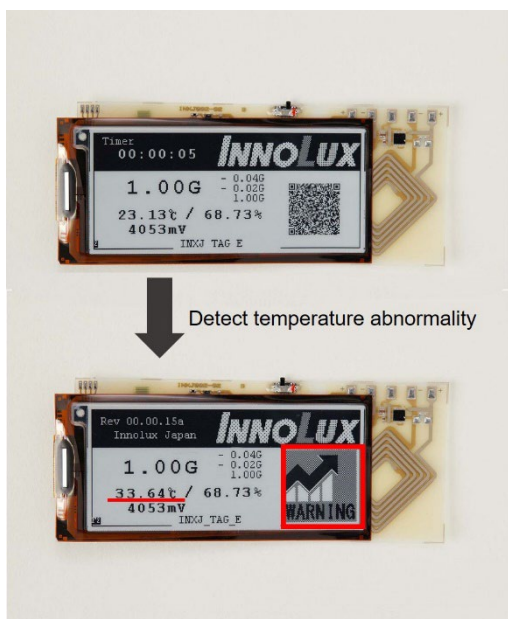
Innolux Japan Co., Ltd. (“Innolux”), ENJI Corporation (“ENJI”), Cold storage Japan Inc. (“Cold storage Japan”) and NGK INSULATORS, LTD. (“NGK”) announced today that they have started development of a temperature and humidity control service using sensor tags to visualize the environment while transporting and storing wine. The service will enable visualization of quality by controlling temperature and humidity at every step from shipment from the winery to delivery, storage, and sales. The service will contribute to the stable supply of high-quality products.

In recent years, awareness of the quality control of food and pharmaceuticals has been growing due to practices such as HACCP (\*1) and GDP (\*2), and there has been increasing demand for quality control during transportation, from a perspective of ensuring traceability. Wine is among the food products for which control of the storage environment is an important factor, including during transportation, since the quality is significantly affected by temperature and humidity. Furthermore, since strengthening quality control during transportation requires a logistics control system that can detect abnormalities in real time, there has been increasing demand for thin, easy-to-use electronic tags. In light of this situation, the four companies, each with expertise in the fields of logistics and IoT, have joined forces to start development of a logistics control service.

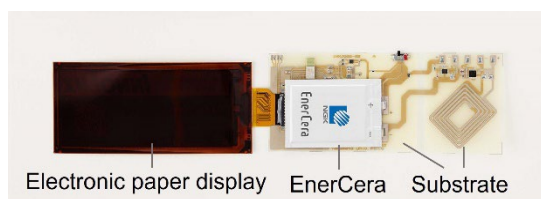
The sensor tags being developed for the service are equipped with NGK’s EnerCera® lithium-ion rechargeable batteries and Innolux Japan’s sensor tag utilizing FHE technology (\*3) and equipped with electronic paper display. Any detected abnormality in temperature, humidity, and others during transportation and storage is displayed on the electronic paper display, enabling to be viewed at a glance. Moreover, unlike monitoring tags that uses disposable batteries, these tags are rechargeable and can be used repeatedly. Since the tags have a thin profile and can tolerate bending, they can also be mounted on curved surfaces or in restricted space. A trial test conducted in January 2022 succeeded in obtaining 130 continuous hours of storage temperature and humidity data inside a wine cellar. The companies also plan to conduct a trial test monitoring temperature and humidity over about 60 days for wine being transported from Italy to Japan.

Looking forward, in addition to temperature and humidity control, the companies are also proceeding with development to enable to monitor and record such as shocks during transport and/or positional information. Since EnerCera battery can tolerate a wide temperature range compared to conventional rechargeable batteries and can be used in areas under direct sunlight or in cold chain logistics applications, there are plans to trial the tags in a wide range of fields outside of wine industry, such as food and pharmaceuticals. The four companies will continue to contribute their knowledge to applying IoT to logistics, aiming to equip society with safe, secure, and high-quality logistics control services.

- (\*1) HAACP: Hazard Analysis and Critical Control Point  
An international hygiene management method for ensuring produce safety in which food and other business operators control all processes from inward shipment of raw materials to outward shipment of products to ensure the elimination or reduction of hazard factors, such as contamination by food poisoning bacteria or foreign objects.
- (\*2) GDP: Good Distribution Practice  
Basic guidelines for ensuring quality in the distribution process for pharmaceuticals.
- (\*3) FHE: Flexible Hybrid Electronics.  
A technology for configuring systems by combining printed metal circuit technology with existing semiconductors and electronic components.



Example of notification on electronic paper display when temperature



Example of sensor tag fitted to a wine

### Roles of each company

Innolux	Develop and trial sensor tags
ENJI	Organize the wine import process
Cold storage Japan	Develop and trial cold chain logistics system
NGK	Develop and trial sensor tag power source (EnerCera battery)

\*About Innolux Japan Co., Ltd.

Innolux Japan Co., Ltd. is the Japanese subsidiary of world-leading LCD panel maker, Innolux Corporation (Taiwan). In December 2017, Innolux Japan Co., Ltd. merged with Innolux Technology Japan Co., Ltd. and made a new start with headquarters in Kawasaki and a location in Kobe. The company develops, manufactures, and sells LCD display products for various applications, such as vehicles, aircraft, medical, and industry using active matrix (AM) technology. In 2021, as the Japanese subsidiary, the company started a proprietary business selling mini-LED displays using AM and developing, manufacturing and selling FHE sensor tags. [www.innolux.com/en/](http://www.innolux.com/en/)

\*About ENJI Corporation

Founded in 2020, ENJI JAPAN is a specialist trading company that imports, wholesales, and retails exclusively Italian wine controlling the temperature rigidly at around 15°C over a 24-hour period, based on the concept of “bringing the flavor of the winery freshly to the table.” At temperatures of 20°C and above, the flavor and taste of wine begin to deteriorate as it is a fresh product. Considering this, ENJI JAPAN developed an original distribution system based on science to maintain steady temperature during the journey from the winery to the homes of consumers. It is the first such service in the world to trace temperature control during the transportation process from the producer to supply wine safely and securely to consumers. The company is committed to continuing its efforts to create a world where anyone can enjoy the same freshness as in the winery, anywhere. [www.enji-wine.jp/](http://www.enji-wine.jp/)

\*About Cold storage Japan Inc.

Cold storage Japan Inc. was established in November 2018 as a company to change the world with the next generation of cold chain logistics. By proposing a valuable platform from the logistics industry that it has been involved in as a contractor, the company is striving to solve social issues from a logistics perspective. By fusing various technologies such as IT, refrigeration, thermal insulation, and freshness preserving technologies with logistics, the company will create a completely new refrigerated and frozen goods logistic network to solve social issues that have been unsolved until now, such as CO2 reduction, food loss reduction, and effective use of unused food materials. <https://cold-storage.jp/language/en/>

\*About NGK INSULATORS, LTD.

NGK INSULATORS (NGK) is a leading company in the field of ceramics. Since its foundation in 1919, NGK has used its unique ceramic technology to provide numerous ground-breaking products that solve social issues. Today, NGK is active in more than 20 countries worldwide, with business foci including mobility, energy, IoT and industry. As one of the largest manufacturers of ceramic substrates for automotive catalytic converters, NGK is actively reducing the strain on our global environment. Furthermore, NGK's products include the energy storage system “NAS” batteries, in addition to the compact, thin, and high-energy-density lithium-ion rechargeable battery “EnerCera” series, vital tools for sustainable energy infrastructure. Through providing innovative, high-quality products, NGK is committed to contributing to our society. In order to create a future where people can coexist with nature, NGK will continue to develop and provide products that support social infrastructure while preserving the environment. [www.ngk-insulators.com/en/](http://www.ngk-insulators.com/en/)

EnerCera Special website <https://enercera.ngk-insulators.com/en/>