Osaka Gas Launchs AI-based Composition Estimation System for Advancing DX in Manufacturing Industries

— Contributing to the Realization of High-quality, Stable Production Systems —

November 27, 2025
Osaka Gas Co., Ltd.

Osaka Gas Co., Ltd. (Representative Director and President: Masataka Fujiwara; hereinafter, “Osaka Gas”) has developed an AI-based composition estimation system (hereinafter, “the system”), which enables high-quality, stable manufacturing of products through the combination of near-infrared spectroscopy technology[*1] and AI, both of which are proprietary technologies refined by Osaka Gas.

The system will be offered by Osaka Gas’s two sales partners: NOMURA JIMUSHO, INC. (Representative Director and President: Shoji Nomura; hereinafter, “NOMURA JIMUSHO”), a trading company that offers and proposes unique technologies, products, and services from around the world, and Fujiwara Techno-Art Co., Ltd. (Representative Director and President: Keiko Fujiwara, hereinafter, “Fujiwara Techno-Art”), a brewing machinery manufacturer that focuses on fermentation and brewing technologies, including *koji* production, and has an impressive delivery track record in Japan and overseas.

To further expand its network of sales partners, Osaka Gas will help advance digital transformation (DX) across diverse manufacturing industries.

■ Development background

In Japan’s manufacturing industries, a labor shortage due to a declining population as well as a lack of successors to skilled workers has become increasingly severe. The challenge is how to pass on delicate process control expertise, which is described as “tacit knowledge” (personal experience and intuition), to the next generation and ensure stable production of high-quality products.

Meanwhile, Osaka Gas has developed its own proprietary sensing technologies,[*2] including gas sensing technology, image analysis technology, non-contact temperature measurement technology, and near-infrared spectroscopy technology, built upon unique insights into how food changes during cooking and processing acquired through the development of cooking appliances over many years. The company has been working to quantify and visualize the changes in product material composition (such as moisture and gas generation) and the changes in their state (such as structure and temperature).

Through its initiative to solve social issues based on commercialization and societal implementation of these technologies, Osaka Gas has developed a system that contributes to a sustainable production structure by combining its proprietary near-infrared spectroscopy technology developed by the R&D team, with in-house AI platform development technology from the data analysis team, and the know-how acquired by the team responsible for implementing technologies in society to build business models and find partners.

■ **Overview of the AI-based composition estimation system**

This proprietary system, developed by Osaka Gas, estimates the material composition (such as moisture content, protein, and fat) of target objects by continuously irradiating them with near-infrared light during the manufacturing process. The reflected light is then analyzed by Osaka Gas's proprietary AI to provide highly accurate, real-time results.

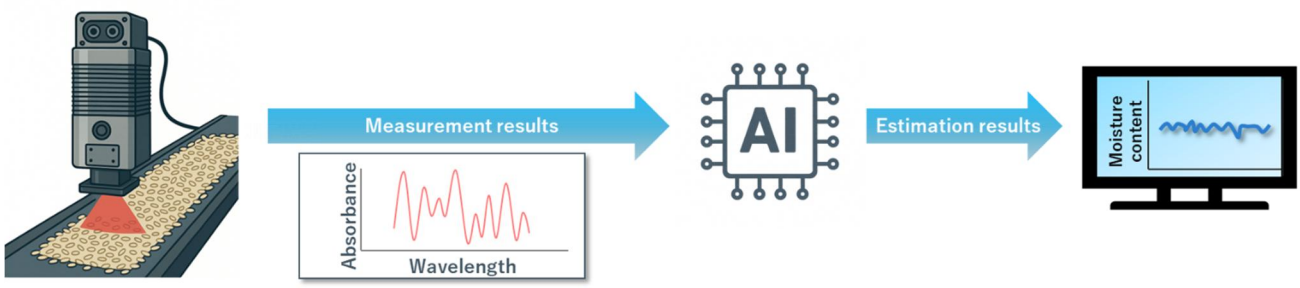

Figure: Image of the AI-Based Composition Estimation System Usage

Main features of the AI-based composition estimation system

1. **Enabling real-time, non-destructive, and non-contact estimation of material composition**
   Real-time material composition estimation in-situ significantly reduces the time required to transport samples to the quality control room and wait for analysis. Furthermore, automated, non-destructive, non-contact measurement does not damage the target objects, reducing product scrap caused by inspection and the risk of damage and contamination from contact. This eliminates losses due to sampling inspections, leading to improved yield.

2. **Capable of handling changes in state and variety by constructing a general-purpose AI model with an AI-based algorithm**
   In the conventional technique,[*3] it was necessary to generate calibration curves[*4] to accommodate changes in the state (for example, from raw rice to steamed rice) and variety of target objects. In contrast, this system constructs a general-purpose AI model by utilizing an algorithm[*5] that identifies complex correlations. This eliminates the need to regenerate calibration curves to accommodate changes in state and variety, realizing consistent, highly accurate material composition estimation.

The system quantifies the state of raw materials and manufactured products, which was previously assessed using "tacit knowledge" (personal experience and intuition), and controls production equipment based on the objective data, thereby ensuring stable manufacturing of products. The system also automates process control, which is a resource-intensive task, to realize DX at production sites.

■ Future outlook

To help address quality control challenges faced by manufacturing industries, including the food, chemical, and pharmaceutical industries, Osaka Gas will actively conclude sales partnership agreements with external partners that have expertise in the respective industries, beginning with collaboration with NOMURA JIMUSHO and Fujiwara Techno-Art. By deploying its sensing technology to many more sites, Osaka Gas will offer solutions that underpin DX and the sustainable growth of Japan's manufacturing industries as a whole.

*1: A method of irradiating a target object with near-infrared light and identifying and quantifying its components based on the degree of light absorption.

*2: A technology that uses sensors (detectors) to measure and quantify various types of information.

*3: A calculation technique based on the assumption that inputs and outputs are directly proportional, such as linear regression analysis.

*4: A formula showing the relationship between the amount of a known component (such as concentration) and the value measured by an analytical instrument.

*5: A technique capable of learning and inferring complex relationships between inputs and outputs (such as discontinuous changes and irregular patterns).

■ Company Profiles

Osaka Gas

Company name	Osaka Gas Co., Ltd.
Head Office	4-1-2 Hiranomachi, Chuo-ku, Osaka
Representative	Masataka Fujiwara, Representative Director and President
Established	April 10, 1897 (founded: October 19, 1905)
Business description	Production and sale of gas; generation and sale of electricity, etc.

NOMURA JIMUSHO

Company name	NOMURA JIMUSHO, INC.
Head Office	7F Hibiya Central Bldg., 1-2-9 Nishi-Shinbashi, Minato-ku, Tokyo
Representative	Shoji Nomura, Representative Director and President
Established	July 20, 1964 (founded: February 8, 1933)
Business description	Import, export, and sale of specialty chemical products; import and sale of petroleum refining catalysts, etc.

Fujiwara Techno-Art

Company name	Fujiwara Techno-Art Co., Ltd.
Head Office	2827-3 Tomiyoshi, Kita-ku, Okayama
Representative	Keiko Fujiwara, Representative Director and President
Established	February 2, 1950 (founded: June 15, 1933)
Business description	Development, design, manufacture, installation, and sale of brewing and food machinery and bio-related equipment, as well as plant engineering, etc.