Tokyo, Japan – September 1, 2023

Yokogawa Solution Service and Phytochem Products Begin Collaboration for the Utilization of Unused Biomass Resources Generated from the Vegetable Oil Production Process – Toward the realization of a circular economy through the use of energy-efficient and high-yield production technology –

Yokogawa Solution Service Corporation and Phytochem Products Inc. announce the signing of an agreement whereby the two companies will collaborate in the development of a technology for the extraction of functional ingredients and biofuel-from byproducts that have been discarded during the vegetable oil production process.

Collaboration Background

Further efforts are needed to drive the shift from a linear economy, where large amounts of goods are produced, used, and discarded, to a circular economy, where the disposal of goods is kept to a minimum and discarded materials are reused as resources whenever possible. By improving production yields and modifying processes, industries are trying to reduce and make further use of the byproducts that they generate, but more needs to be done in this area. Byproducts from the production of rice, palm, rapeseed, soybean, and other vegetable oils contain useful compounds such as vitamin E, which has an excellent antioxidant effect, but many of these materials end up being thrown away because the recovery process is difficult and unprofitable, requiring high-temperature and high-vacuum conditions.

To address this challenge, Yokogawa Solution Service and Phytochem Products have agreed to work together on the establishment of a technology that will save energy and enable the highly efficient recovery of functional ingredients contained in the byproducts generated in the vegetable oil production process.

Collaboration Details

Phytochem Products is a startup company with a unique technology for extracting useful ingredients from vegetable oils using ion-exchange resins. The ion exchange resin method eliminates the need for high-temperature and high-vacuum conditions and thus is a more energy efficient way to extract useful compounds from the byproducts of vegetable oils. This method improves the yield of vitamin E, which is sensitive to heat, and is safer as it uses none of the toxic substances that are normally used in conventional techniques.

Based on its measurement, control, and information technologies, Yokogawa Solution Service provides production control systems, measuring instruments, and other solutions that realize highly efficient and safe operations at all kinds of plants. Under the terms of their agreement, Yokogawa Solution Service and Phytochem Products will use a Phytochem Products bench plant to conduct testing of the technical applicability of sensing and process control in the ion exchange resin method. Leveraging Phytochem's expertise in the use of measurement data in the separation and recovery process, Yokogawa Solution Service will examine methods

for the real-time analysis, estimation, and measurement of functional ingredients and make use of Yokogawa's modeling technology for the automation and optimization of the recovery process.

The Phytochem Products bench plant in Sendai City, Miyagi Prefecture

The two companies plan to complete the testing and verification of technology at this bench plant by June 2024. After implementing this technology at a pilot plant, the plan is to begin providing customers licenses for this ion exchange resin process together with the associated measurement and modeling technologies in fiscal year 2026.

Through this collaboration, Yokogawa Solution Service and Phytochem Products aim to eliminate the waste of biomass resources and thereby help to realize a circular economy in which people can live sustainably and avoid breaching planetary boundaries.

About Yokogawa

Yokogawa provides advanced solutions in the areas of measurement, control, and information to customers across a broad range of industries, including energy, chemicals, materials, pharmaceuticals, and food. Yokogawa addresses customer issues regarding the optimization of production, assets, and the supply chain with the effective application of digital technologies, enabling the transition to autonomous operations.
Founded in Tokyo in 1915, Yokogawa continues to work toward a sustainable society through its 17,000+ employees in a global network of 129 companies spanning 60 countries.
For more information, visit www.yokogawa.com

About Yokogawa Solution Service Corporation

Yokogawa Solution Service was established in April 2013 by integrating the domestic sales, engineering, maintenance, and service operations of Yokogawa's control business, which has a total of 2,572 employees and sales of ¥105.7 billion (in fiscal year 2022). Its business includes the sale, maintenance, electrical

instrumentation construction, total solution provision, and engineering for control and measurement equipment, targeting a broad range of industrial customers.
https://www.yokogawa.com/yjp/

About Phytochem Products Inc.

Phytochem Products is a startup company established in June 2018 by Professor Kitakawa at Tohoku University Graduate School of Engineering. Its business includes the manufacture and sale, commissioned research, and design of research equipment and PoC facilities for plant-derived functional food ingredients, cosmetic raw materials, pharmaceutical ingredients, and various fatty acid esters extracted using the ion exchange resin method.
https://phytochem-products.co.jp/