

## **PRESS RELEASE**

### **Shimadzu signs a collaboration agreement with TOTAL, a major Energy player and two European universities**

#### **Toward the Development of an Innovative "Oxygenated compound analysis system" for Biofuel Research**

**Feluy, 19<sup>th</sup> January 2021** – Shimadzu has signed comprehensive collaboration agreements in the clean energy field with TOTAL SE, University of Pau (UPPA) in France, and University of Oviedo (UO) in Spain. The four parties aim to develop an "Oxygenated compound analysis system" within two years to research biofuels. This system is a breakthrough analyzer combining Shimadzu gas chromatography with the patented technology jointly owned by TOTAL, UPPA, and UO.

To achieve carbon neutrality by 2050, we must reduce our dependence on fossil fuels by using biofuels and bioethanol for more carbon-neutral transportation, as biofuels emit less than half the CO<sub>2</sub> of fossil fuels over their lifecycle. Biofuels generally contain oxygenated compounds, such as organic acids, aldehydes, and phenols, that cause the fuel's transformation. It would not be difficult to remove them if the compounds could be identified. However, since bio-derived biofuels contain many unknowns oxygenates, it is technically challenging to identify them efficiently, and an industry-standard analytical method has not been established yet.

TOTAL, UPPA, and UO have patented a breakthrough technology, "The compounds separated by a gas chromatograph are decomposed to the elemental level, and the oxidation catalytic reaction is promoted to be detected using a mass spectrometer (MS)." With this patented technology, the identification process of oxygenated compounds in biofuels can be reduced to several tens of minutes from hours. The traditional method is "Examine and select hundreds of chromatogram peaks one at a time (the MS spectrum pattern indicating the presence of a compound)." Besides, analysis results can be obtained regardless of the user's skill level. The "Oxygenated compound analysis system" developed by Shimadzu, TOTAL, UPPA, and UO will improve research, development, and manufacturing processes to expand biofuels' utility.

"This innovation is the result of the collaboration between TOTAL R&D and the Universities of Pau and Oviedo and is perfectly in line with TOTAL's climate ambition to get Net Zero by 2050 together with society. The transformation of biomass into products requires a precise measurement during industrial processes, we are happy to work with Shimadzu to accelerate this innovation to meet industry neutrality targets." Said Marie-Noëlle SEMERIA, CTO Senior Vice President, Group R&D of TOTAL.

"It has been 50 years since Shimadzu began to produce gas chromatograph mass spectrometers domestically in Japan in cooperation with European manufacturers. During this time, we have developed many unique products through various innovations. We are very honored to be able to work again with renowned European universities and companies to develop technologies that contribute to the environment." Said Shuzo Maruyama, General Manager, Analytical & Measuring Instruments Division, Shimadzu Corporation.

## About Total Research and Development

Total is deploying an ambitious R&D program, worth nearly \$1 billion a year. Total R&D relies on a network of more than 4,300 employees in 18 research centers around the world, as well as on numerous partnerships with universities, start-ups and industrial companies. Its investments are mainly devoted to a low-carbon energy mix (40%) as well as to digital, safety and environment, operational efficiency and new products. It files more than 200 patents every year.

## About Total

Total is a broad energy company that produces and markets fuels, natural gas and electricity. Our 100,000 employees are committed to better energy that is more affordable, more reliable, cleaner and accessible to as many people as possible. Active in more than 130 countries, our ambition is to become the responsible energy major.

## University of Pau (UPPA)

Situated near the border with Spain, the Université de Pau et des Pays de l'Adour (UPPA) is a multi-site, multi-discipline university. More than 14000 students are studying sciences and technology, literature, languages, social sciences, law, management, or economics within the 4 campus of the University. In 2017, UPPA has been laureate of the I-SITE (Excellence initiative launched in France in 2017) with the project Energy and Environment Solution (E2S UPPA). The core scientific domain of the project focuses on Environment and Energy and relies on strongly recognized laboratories supported by state-of-art equipment. Upon the obtention of the I-Site label, in 2017, the university then registered the brand E2S UPPA, both as the new name of their project and as a mirror of the university involvement. One of E2S UPPA principal assets is its strong relationships with major international companies which can find in this partnership the scientific excellence they expect. Their industrial R&D centres on the site are already a key factor in consortium policy and will play a growing part for the next ten years.

## University of Oviedo (UO)

University of Oviedo is a public institution of higher education and research in the Principality of Asturias, on the north coast of Spain. With over 400 years of history, it offers a full range of undergraduate degrees adapted to the European Higher Education Area (EHEA) in all branches of knowledge and postgraduate degree programs in collaboration with national and international universities and more than 250 companies. University of Oviedo undertakes 80% of the R&D and Innovation activities carried out in Asturias and has cutting-edge services and facilities to facilitate the transfer of knowledge to the business world. The income it obtains from scientific output amounts to around 40 million euros a year, with nearly 500 contracts or agreements with companies to carry out research projects. The Asturian institution also boasts two specialized clusters (Energy, Environment and Climate Change, and Biomedicine and Health) with close ties to the regional technology parks and the Asturian healthcare network.

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