

# Analytical & Measuring Instruments Business Presentation Materials

**Shimadzu Corporation**

**Shuzo Maruyama, Senior Managing Executive Officer and  
Analytical & Measuring Instruments Division General Manager**

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# I. Current Status of Analytical & Measuring Instruments Businesses

## I. Current Status of Analytical & Measuring Instruments Business 1 of 2






# Steady Recovery, Mainly for Key Models and China

- The global spread of the COVID-19 pandemic between January and March 2020 had a major impact on business results, due to customer laboratory closures, travel restrictions, and other major constraints on our business activities.
- Results for the Analytical & Measuring Instruments segment have been steadily recovering since April, mainly for key models and China.
  - ▶ Mainly for key models, we offered customers remote services, installed products with strict measures for preventing infection, and strengthened business deployment in healthcare and pharmaceutical fields with lively demand.
- To address the important emergency challenges specified in the new medium-term management plan that started in April 2020, we launched “Infectious Disease Countermeasure Projects” and promoted initiatives to actively solve challenges in society.

FY 2020 Net Sales (YoY)	Jan. - Mar.	Apr. - Jun.	Jul. - Sep.
<b>Analytical &amp; Measuring Instruments</b>	-12%	-4%	-3%
Key Models	-11%	-4%	<b>5%</b>
China	-41%	<b>10%</b>	<b>15%</b>

# I. Current Status of Analytical & Measuring Instruments Business 2 of 2

## Overview and Measures by Region


		Overview
Japan		<ul style="list-style-type: none"> <li>• In the first half, novel coronavirus detection kit sales grew, but overall sales decreased due to capital equipment investment reluctance.</li> <li>• Sales for pharmaceuticals remained strong, demand also recovered in electrical, chemical, and other fields, and sales of reagents and equipment for PCR testing expanded.</li> <li>• Response to supplementary budget appropriations and academic budgets and efforts to promote infectious disease countermeasure projects were strengthened.</li> </ul>
North America		<ul style="list-style-type: none"> <li>• In the first half, sales were impacted by university and laboratory closures but increased due to OEM supply of MALDI-TOF MS systems.</li> <li>• Investments continue to stagnate at small/medium clinical testing laboratories, due to the COVID-19 pandemic.</li> <li>• LC and LC-MS sales efforts were strengthened in the pharmaceuticals market.</li> </ul>
Europe		<ul style="list-style-type: none"> <li>• In the first half, despite expanded food analysis demand in Russia, overall sales decreased due to university and laboratory closures and other factors.</li> <li>• COVID-19 impacts continue, but clinical, pharmaceutical, and academia demand is recovering.</li> <li>• Responded to economic policies in respective countries and promoted comprehensive measures to fight the pandemic.</li> </ul>
China		<ul style="list-style-type: none"> <li>• COVID-19 impact was large during January to March 2020, but recovery has continued since April.</li> <li>• Demand for LC, LC-MS and GC-MS is expanding in pharmaceutical and food fields, due to regulatory revisions.</li> <li>• Due to Chinese Pharmacopoeia revisions, demand continues to be strong for analyzing herbal medicine components and residual pesticides.</li> </ul>
Other Asian Countries		<ul style="list-style-type: none"> <li>• In the first half, sales decreased due to lockdowns and other factors.</li> <li>• In India, capital investment levels are recovering for pharmaceuticals, due to efforts to strengthen domestic production of pharmaceutical ingredients.</li> <li>• Sales for pharmaceuticals are expanding in ASEAN countries and we responded to increased demand in automotive and battery fields in India.</li> </ul>

## **II. Growth Strategies for Analytical & Measuring Instruments Business**

## II. Growth Strategies for Analytical & Measuring Instruments Business 1 of 7

# Growth Strategies and their Deployment

### Growth Strategies

- 1) Expanding Sales in US and European Markets
- 2) Market Strategy: Constantly Develop New Demand
- 3) Product Strategy: Implement Measures to Build an Extensive Product Portfolio and Promote Automation of Analysis
- 4) Infectious Disease Countermeasure Projects: Create Systems for Fighting Infection
- 5) Innovation Centers (US, Europe, China, and Asia): Promote Joint Advanced Research and Joint Development Collaborations with Leading Researchers in Regions throughout the World  p. 18

### Businesses Deployed

Area	Main Business Fields	Challenges in Society	Issues Addressed by Shimadzu
Human health	Clinical Pharmaceutical Life science	<ul style="list-style-type: none"> <li>• Promoting healthcare that is effective for addressing aging society</li> <li>• Promoting preventive healthcare</li> <li>• Routine health management based on a growing interest in health</li> <li>• Development of revolutionary new drugs based on life sciences</li> <li>• Strengthening infectious disease countermeasures</li> </ul>	<ul style="list-style-type: none"> <li>✓ Diagnosis, treatment support</li> <li>✓ Drug discovery support</li> <li>✓ Cell culture analysis</li> <li>✓ Infectious disease testing and therapeutic drug development support</li> </ul>
Global environment	Materials and chemicals Environment	<ul style="list-style-type: none"> <li>• Widespread use of light-weight materials in automobiles and aircraft</li> <li>• Mitigation of global warming and reducing marine plastic pollution</li> </ul>	<ul style="list-style-type: none"> <li>✓ Support for developing new materials with lighter weight and lower environmental impact</li> <li>✓ Determination of marine pollution status</li> </ul>
Safety and security	Foods Forensics (academia)	<ul style="list-style-type: none"> <li>• Improving the safety of foods</li> <li>• Stronger countermeasures for illegal drugs and doping</li> </ul>	<ul style="list-style-type: none"> <li>✓ Analysis of residual pesticides and regulated substances</li> <li>✓ Accurate analysis of increasingly complex illegal/regulated chemicals</li> </ul>



## II. Growth Strategies for Analytical & Measuring Instruments Business 2 of 7

# 1) Expanding Sales in US and European Markets

### ■ Deploy Business in US Pharmaceuticals Market



**Strengthen/expand/improve sales capabilities**

**Offer solutions for US pharmaceuticals market**

- Strengthen customer relations and develop a broad grasp of customer challenges
- Expand joint development with customers (Innovation Center)

**Strengthen deployment of products and services for each phase in the pharmaceuticals market**

- Expand deployment for each phase in the pharmaceuticals market, including discovery (drug discovery candidate search/purification), new drug development (Phases I to III), and production (optimization and quality control).
- Deploy novel coronavirus detection kits and start up contract analysis business

### ■ Deploy Business in European Clinical Testing Market



**Strengthen clinical solutions in Europe**

- Expand large key accounts
- Strengthen solution development and deploy solutions to contract testing institutions (European Innovation Center)
- Expand/improve logistics function
- Joint development with customers

**Strengthen solution development**

- Develop software and peripheral accessories
- Offer new reagent kits [such as by developing kits for therapeutic drug monitoring (TDM) of blood concentrations of immunosuppressants or other drugs] from reagent subsidiary Alsachim in France

## II. Growth Strategies for Analytical & Measuring Instruments Business 3 of 7

# 2) Market Strategy A: Constantly Develop New Demand

- Identify new demand for analysis in each field as soon as possible and deploy businesses for dedicated applications, dedicated instruments, or other solutions before competitors do.
- Never stop building sources of growth globally.

### Foods (safety and benefits)

- Continuously satisfy needs for food analysis, mainly for residual pesticides (safety) and active ingredients (benefits).
  - Satisfy currently expanding demand for residual pesticide analysis in Russia, Western Europe, China, and other areas, and also demand for analysis of legalized cannabis in North America.
- In Europe, demand is expanding for testing foods and containers for mineral oil content.



**GC/MS Method Package  
Ver. 2 for Residual  
Pesticides**

### Pharmaceutical

- Strengthen deployment in very large US market.
- Satisfy expanded demand after enforcement of Chinese Pharmacopoeia revisions in December 2020.



**LC Nexera Series**



**Chinese  
Pharmacopoeia**

### Clinical

- Use synergy with French subsidiary Alsachim's reagents to expand mass spectrometer use for clinical testing.
- Deploy PCR testing reagents/instruments for novel coronavirus detection and accelerate infectious disease business.



**LCMS-8060**

### Environment

- In addition to dedicated water quality and atmospheric monitors, offer a variety of other environmental measuring systems as applications for chromatographs and mass spectrometers.
- Demand is expanding for analysis of per- and polyfluoroalkyl substances (PFAS) in drinking water and soil.
- Also satisfy needs for analyzing increasingly evident marine plastic pollution.

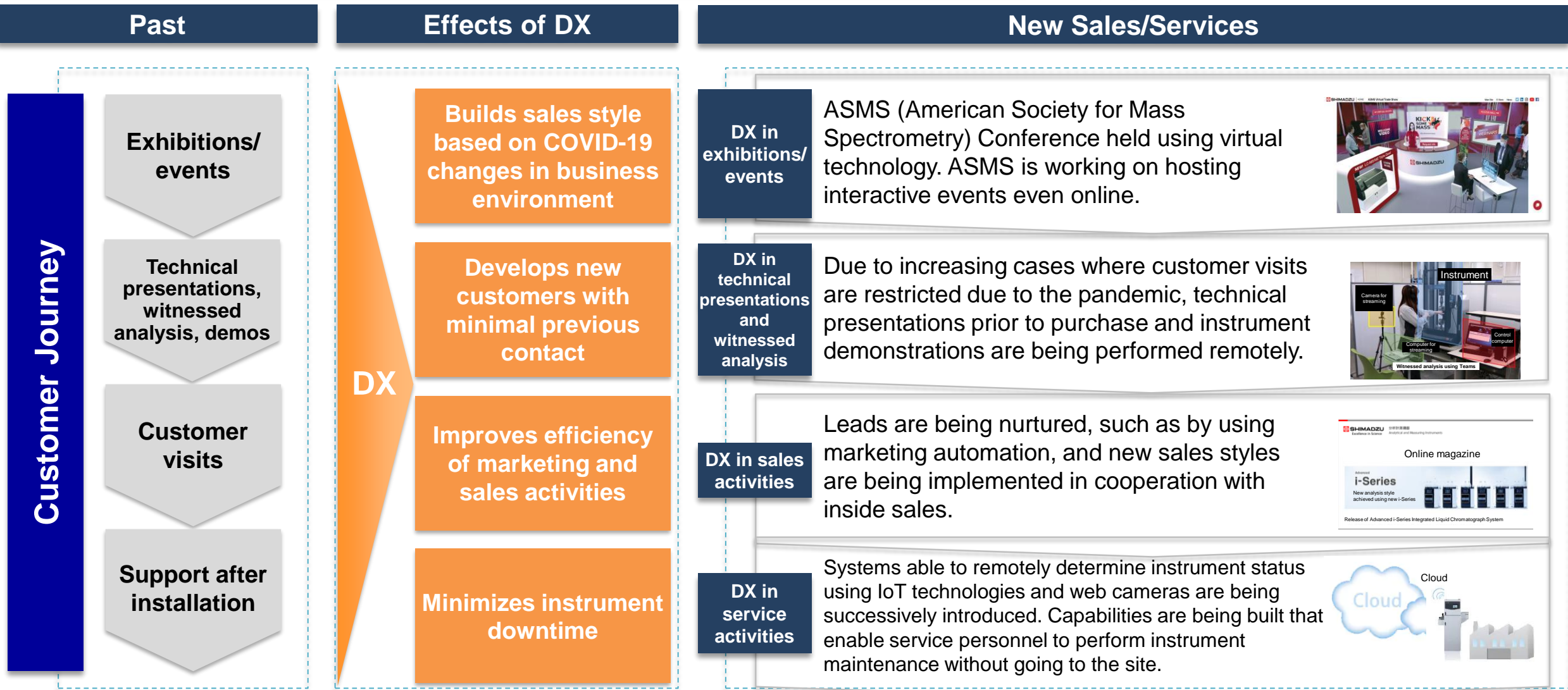


**Smart Pesticides  
Database Ver. 2**

## II. Growth Strategies for Analytical & Measuring Instruments Business 4 of 7

### 2) Market Strategy B:

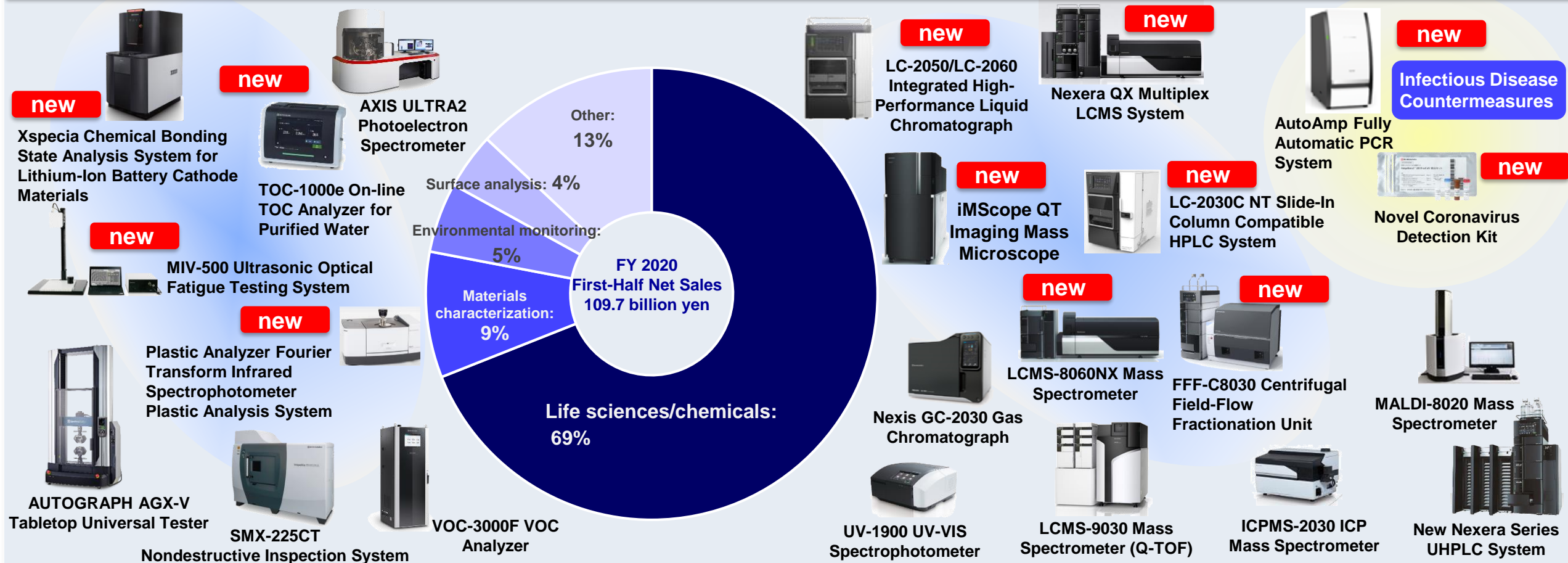
### Deploy New Businesses Based on Digital Transformation (DX)



## II. Growth Strategies for Analytical & Measuring Instruments Business 5 of 7

### 3) Product Strategy A: Build an Extensive Product Portfolio

- Stimulate demand by supplying diverse products that satisfy demand for increasingly complex and sophisticated analysis and by releasing new products as needed.
- During the COVID-19 pandemic, deploy business with focus on life science products and respond to demand trends as soon as possible. (Life sciences/chemicals sales ratio: Expanded from 64 % in FY 2019 to 69 % in the first half of FY 2020)





## II. Growth Strategies for Analytical & Measuring Instruments Business 6 of 7

### 3) Product Strategy B: Promote Automation of Analysis

- Expand sales of pretreatment systems, mass spectrometers, and data analysis software at large clinical testing laboratories.
- Provide support for promoting automation of therapeutic drug monitoring (TDM), etc.

#### Measures to Promote Automation of Analysis

Expand sales of pretreatment, component analysis, data analysis, and other products for laboratory automation systems (LAS) for clinical testing at hospitals and large testing laboratories.



<Pretreatment (Automatic Pretreatment System)>



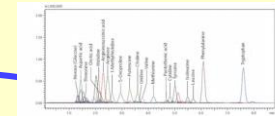
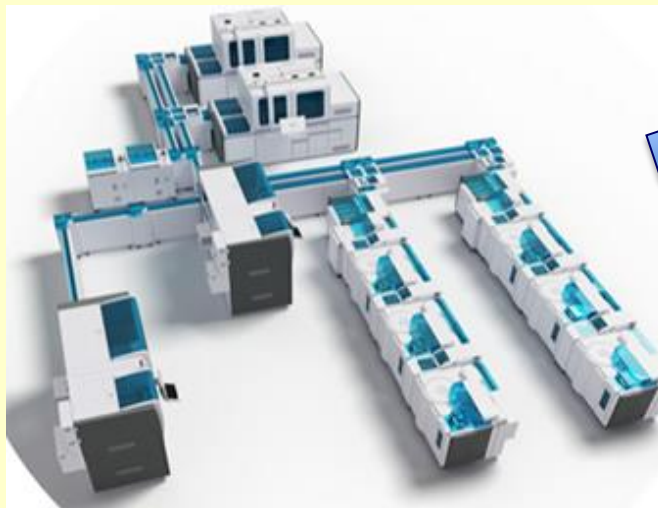
CLAM-2030CL



<Component Analysis (Mass Spectrometer)>



LC-MS



<Data Analysis (Software)>

Peakintelligence™  
Automatic detection of LC-MS peaks



<Analysis Report>



### III. Growth Strategies for Analytical & Measuring Instruments Business 7 of 7

#### 4) Infectious Disease Countermeasure Projects: Create Systems for Fighting Infection

- Implement measures to offer solutions for analyzing viruses, bacteria, and other pathogens as infectious disease countermeasures, which is a serious challenge for society.
- Aim to create systems for fighting infectious diseases rather than offering only products, by actively collaborating with academia, hospitals, healthcare institutions, and others.
- Contribute to international society by engaging in countermeasures to prevent the spread of COVID-19 and fight infectious diseases in general.

Products


Creating Systems

#### Virus Testing

**PCR Testing Reagents and Systems**



**Rapid Testing (Non-PCR Measures)**  
Direct detection of viruses by MALDI-TOF



**PCR Testing Business**  
Jointly operated with Oike Clinic in Kyoto




**Kyoto Sangyo University PCR Testing Center**  
Support for establishing center

Kyoto Sangyo University President Kurosaka (right) with Shimadzu President Ueda (left) (Oct. 2020)



**Collaboration with Tohoku University**  
Establish new virus testing method using exhaled breath and deploy healthcare methods using exhaled breath, including predicting progression to severe diseases

Tohoku University President Ohno (right) with Shimadzu President Ueda (left) (Oct. 2020)



#### Pathological Diagnosis (Pneumonia Examination)

**Mobile X-ray system (pneumonia examination)**




➢ Joint research between Cambridge University, Shimadzu Kratos, and Map Sciences  
Virus screening by examination of gargle samples  
<https://www.cambridgeindependent.co.uk/news/could-this-2-50-gargle-test-developed-in-cambridge-be-the-solution-to-covid-19-testing-challenge-9125385/>

- Quick diagnosis
- Simple exhale sample acquisition
- Early diagnosis of pneumonia, allows follow-up diagnosis of serious diseases, and determines therapeutic efficacy
- Identifies virus variants and applicable for non-novel coronaviruses

#### Therapeutic Drug Development Support

**System for measuring blood concentration of candidate therapeutic drugs for the COVID-19 virus**

ALSACHIM  
a Shimadzu Group Company



Therapeutic drug candidates:  
Remdesivir  
Favipiravir  
Nafamostat  
Lopinavir, Ritonavir  
Hydroxychloroquine  
Chloroquine

#### Support for Preventing Infection

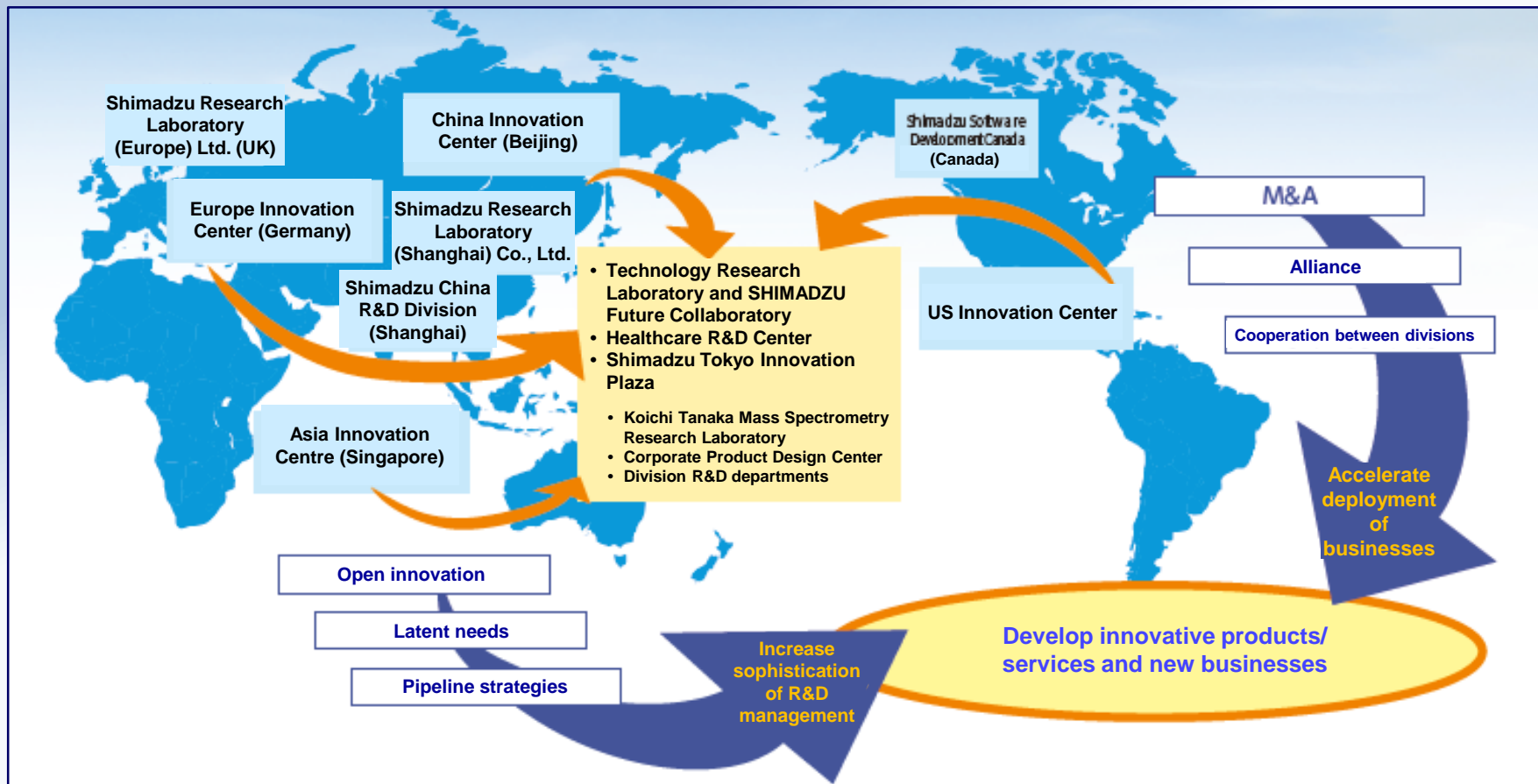
- Standards testing for disinfectant ethanol
- Patient self-interview system

## III. R&D Strategies

### III. R&D Strategies 1 of 4

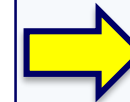
# Global Capabilities and Research Topics

- Strengthen and expand/improve functions for basic research, product/service development, and application technology/software.
- **Start up infectious disease countermeasure projects and accelerate creation of systems for fighting infectious diseases based on reagents and products.**
- Contribute to solving challenges in society using advancements in science and technology.



## Contributing to Solving Challenges in Society Using Advancements in Science and Technology

- **Healthcare**  
Early detection of diseases  
Infectious disease countermeasures  
Promotion of good health, etc.
- **Infrastructure**  
Development of safety systems, etc.
- **Materials**  
Evaluation of new material performance, etc.
- **Environment/energy**  
Environmental monitoring  
Analysis of marine plastic pollution  
Support for extending battery life, etc.





### III. R&D Strategies 2 of 4 Advanced Research with Universities, Etc.

➤ Accelerate advanced research in foods, advanced healthcare, and other areas, with universities, etc.



#### Product development and business creation based on omics: Osaka University

➤ Shimadzu and Osaka University established a joint research laboratory at the university, where they are developing applications based on omics (comprehensive analysis of all molecules within biological organisms).



Osaka University Shimadzu Omics Innovation Research Laboratories (Suita City)



#### Analysis of functional benefits of foods and creation of food-based healthcare industry: National Agriculture and Food Research Organization (NARO)

➤ The laboratory is developing techniques for analyzing functionally beneficial components in food that are essential for developing functionally-enhanced foods.



NARO Shimadzu Kyoto Laboratory for Food Innovation (Kyoto City)



• NARO: National Agriculture and Food Research Organization

#### Joint research to detect Alzheimer's: University Hospital of Montpellier, etc.

➤ Engaged in joint research with the University Hospital of Montpellier on methods to detect evidence of Alzheimer's (amyloid plaque). Deploy business in Europe and the United States based on results achieved from joint research with the National Center for Geriatrics and Gerontology and AIBL in Australia. Research and evaluate MALDI mass spectrometer-based (photo) detection methods.



• AIBL: Australian Imaging Biomarkers and Lifestyle Study of Ageing



#### Joint development of cancer early diagnosis system: Hyogo College of Medicine

➤ A new research facility was established at Hyogo College of Medicine for omic study of diseases based on comprehensive analysis of blood samples collected at the university hospital. Objective is to achieve early diagnosis of cancer using joint research results between Kobe University and National Cancer Center.



### III. R&D Strategies 3 of 4

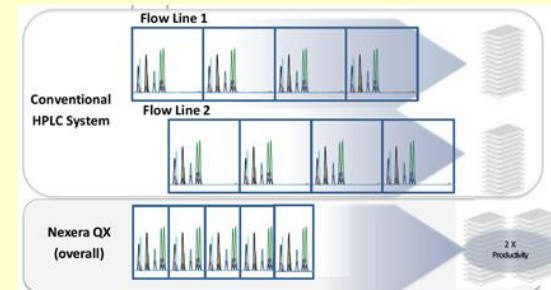
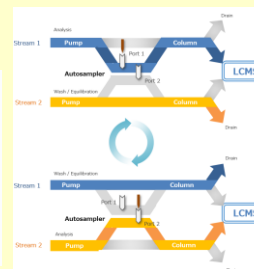
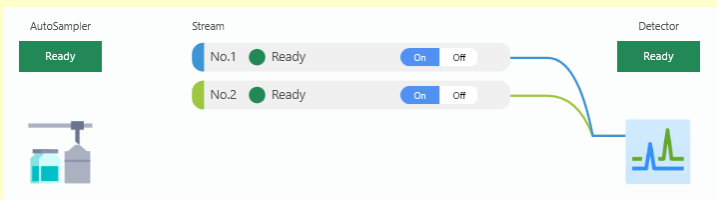
# Joint Development with Customers at US Innovation Center

- Jointly develop advanced systems through collaboration with customers.
- Using dedicated software (Analytical Intelligence) to achieve high performance, advanced functionality, easy operability, and easy maintainability.

## Nexera QX Multi-Stream LCMS System

Partner: Major Testing Laboratory

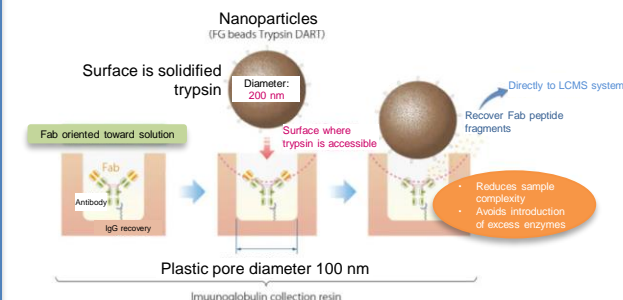
- Connects multiple LC units to a single MS unit to dramatically increase the number of samples that can be analyzed, while also maintaining sensitivity, accuracy, and other performance parameters.
- A newly developed flow line rinsing mechanism reduces carryover without sacrificing throughput.
- Intuitive operability, automatic sample substitution when a problem occurs, and automatic rinsing/restoring if an ultra-high sample concentration was being injected. *p. 22*



## Support System for Checking Antibody Drug Efficacy

Partner: Providence Cancer Institute

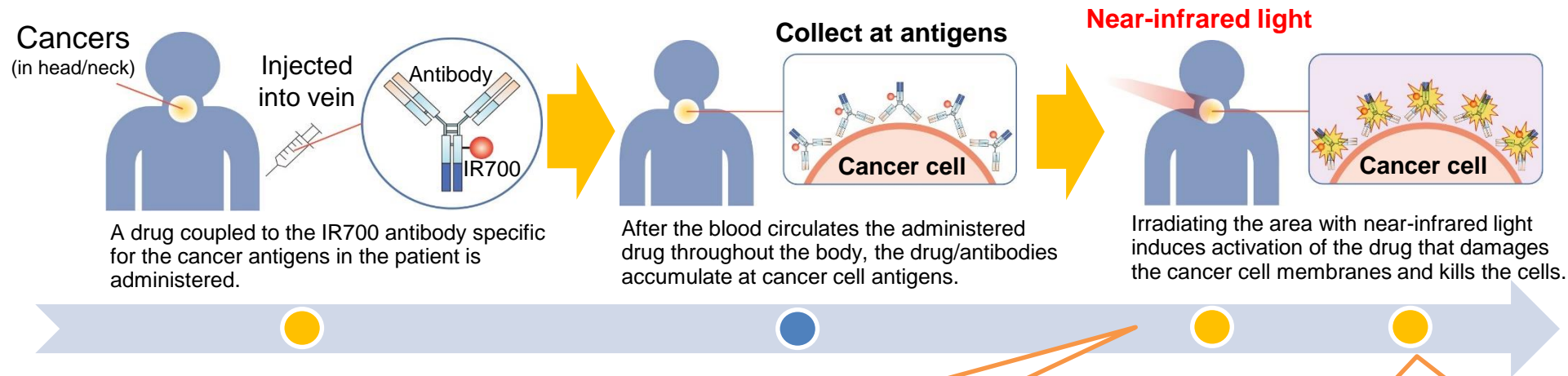
- Establish antibody drug blood concentration monitoring method using Shimadzu's unique nSMOL method.
- Develop method for identifying cancer antigens in combination with genomics and support development, evaluation, and effective use of new cancer immunotherapy methods or cancer vaccines.
- Due to significant improvements in nSMOL-based methods for comprehensive analysis of all antibodies in blood (1000 times less blood volume used and 3 to 8 times more proteins identified than conventional methods), the therapeutic efficacy and effective period of cancer vaccines and coronavirus vaccines can be predicted and evaluated.



# Cancer Photoimmunotherapy Research Support

➤ Participate in cancer photoimmunotherapy (NIR-PIT) research at the National Cancer Institute (NCI) in the United States.

**Process Flow of NIR-PIT Treatment**

LIGHTVISION

**Near Infrared Camera System  
Visualizes progression of reaction  
to near infrared light**

Visualization of chemical reaction to the near infrared light applied during treatment for evaluating and recording efficacy and untreated areas, etc.



DPI-MS



**Mass Spectrometer  
Confirms therapeutic efficacy  
based on urine or blood analysis**

Development of technique for confirming therapeutic effects based on metabolomic analysis of blood or urine.

## IV. Summary

## IV. Summary

# Restoring Growth Track as Soon as Possible

- Demand for measuring instruments is gradually recovering, not only in the strong pharmaceuticals industry, but also in other industries. In terms of infectious diseases as well, demand for analysis is expected to expand for everything from testing to therapeutic drug development.
- Given the circumstances, Shimadzu is expanding/improving sales of mass spectrometers and other high-end models, expanding chromatograph market share (especially in the United States and Europe), and implementing measures related to infectious disease demand.
- Develop new fields and new demand by also expanding/improving software and dedicated equipment for specific analytical applications.
- Expand sales of consumables and subscription services, such as reagent kits for various clinical applications.
- Strengthen joint research with academia and university hospitals, mainly in the healthcare field, and steadily commercialize businesses for high value-added products and services.

## V. Overview of Promising New Products



V. Promising New Products 1 of 4

# Key Model New Products: Liquid Chromatographs

➤ Expand market share and create new demand by offering new integrated LC products and newly deploying LC products in nanomaterial analysis market.

■ Expand Integrated LC Product Line

- **Advanced i-Series:**  
**With Analytical Intelligence functionality**
- Remote operability and monitoring enable performing analytical work from home
  - Automatic operation functionality accomplishes routine processes of experienced operators
  - Antibacterial treatment



Advanced i-Series

- **Compatible with new slide-in columns**
- New columns integrated with flow line and dedicated LC system
  - Uses monolithic columns that enable analyzing large volumes of complex samples
  - Columns can be mounted easily by simple insertion



LC-2030C NT

■ LC/MS System for Ultra-High Speed Large-Volume Processing

- **Two LC streams connected to MS system to increase MS utilization ratio**
- By analyzing streams in parallel, the time required for analyzing large volumes of samples can be shortened
  - Automatic rinsing function is based on predicted flow line contamination



Nexera QX

■ Nanomaterial Particle Size Analyzer System

- **Selectively and accurately fractionates 10 nm-class nanoparticles**
- Separates nanoparticles by strong centrifugal force
  - Supports development of electronic or other parts with advanced functionality that are increasingly made of nanoparticles

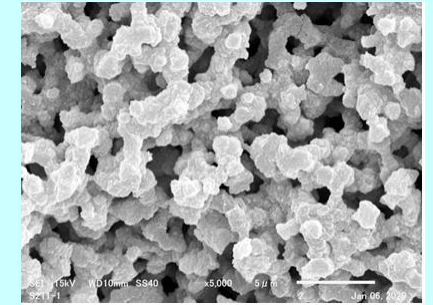


FFF-C8030

# Plate-Type Monolithic Columns and Dedicated HPLC System

## ■ NT-ODS Plate-Type Monolithic Column

- Column is integrated with small plates
- Offers superior characteristics not available from previous columns (packed)
  - ✓ High separation and low pressure → Suited for high-speed separation
  - ✓ Mesh structure prevents clogging → Extends column life



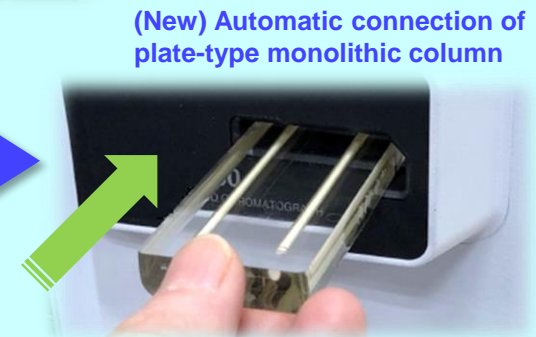
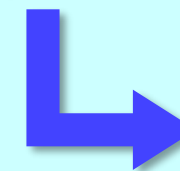
Mesh structure of monolithic columns

## ■ LC-2030C NT Dedicated HPLC System

- Completely new column connection method
- Small-plate column
  - When mounted the column, connection is complete automatically. No tools are necessary
  - No risk of bad data due to connection error
- Deploy for dedicated systems, such as for routine blood or urine analysis
  - Develop new markets



(Previous) Manual connection of packed columns



(New) Automatic connection of plate-type monolithic column



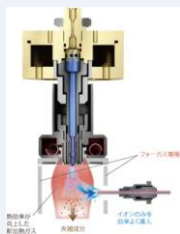
V. Promising New Products 3 of 4

# Key Model New Products: LC-MS/MS

- Release flagship triple quadrupole MS model and expand market share in drug discovery, clinical, food safety, and other markets.
- Offer labor-saving pretreatment equipment and data analysis software as a system.

## ■ Culmination of Triple-Quadrupole MS Development

- Offers highest class of both sensitivity and robustness
- Efficiently eliminates contaminant components
- Lengthens maintenance cycle and minimizes instrument downtime



LCMS-8060NX

## ■ Sample Pretreatment Systems for Blood, Etc.

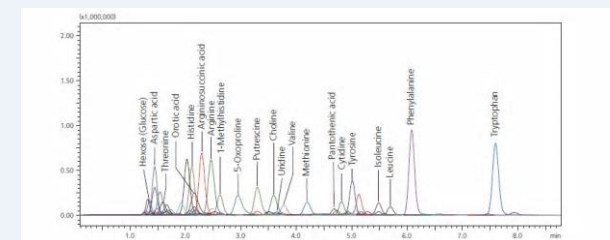
- Registered as Class I medical device
- Simply place blood collection tubes and analysis is executed fully automatically
- Dedicated software offers easy operability
- Equipped with improved accuracy control functionality



System with LCMS and CLAM-2030CL (circled)

## ■ AI Peak Detection Software

- Significantly shortens data analysis process
- Automatically detects peaks in complicated chromatograms by simulating the expertise of experienced operators



Peakintelligence Ver. 2

Saving labor, automation, and eliminating human dependence improves operating efficiency and provides powerful support for flexible working styles.

## V. Promising New Products 4 of 4

# Key Model New Products: Mass Imaging

- New product of imaging mass microscope.
- Microscope images and mass spectrometry data can be used to visualize and quantitate areas where drugs and metabolites accumulate, for example.

### ■ Sample Plate Pretreatment System

- Automates matrix application to samples to achieve imaging mass image acquisition with high reproducibility
- Achieves both high spatial resolution and high sensitivity by processing two stages concurrently

### ■ Imaging Mass Microscope

- Merges MS component distribution information with microscope tissue images (only available from Shimadzu)
- Analyzes MS imaging images quickly
- Enables using a single system for both qualitative/quantitative analysis by LC-MS and also MS imaging

### ■ Imaging Data Analysis Software

- Rapidly analyzes large amounts of information generated from high resolution imaging
- Simple three-step operation saves data analysis labor
- Data analysis can be integrated with MS imaging images from other instruments, such as ICP-MS

#### Sample pretreatment



iMLayer  
(vapor deposition)

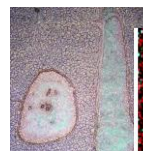


iMLayer AERO  
(spray)

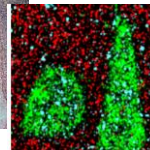
#### MS imaging



iMScope QT

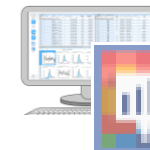


Microscope  
image

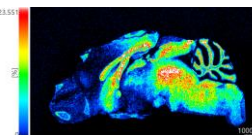


MS imaging

#### Data analysis



IMAGEREVEAL



**Supports advanced research by offering comprehensive solutions for mass imaging analysis**



# SHIMADZU

## Excellence in Science

This document contains forward-looking statements. Forecasts of future business performance that appear in this document are predictions made by the company's management team that are based on information available when these materials were prepared and are subject to risks and uncertainties. Consequently, actual results may differ materially from the forecasts indicated above. Factors that may influence actual business performance include, but are not limited to, economic conditions within and outside Japan, changes in technologies in markets, and fluctuations in exchange rates.

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