



# Session 1: New technologies – new opportunities?

## Enhancing Customs Capacity

### by Introducing New Technology & Creating Innovation

- Japan Central Customs Laboratory's Effort on Fight against Drug Trafficking -

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# Topic

1. Japan Central Customs Laboratory
2. Providing Intelligence by using Chemical Analysis
3. Fighting NPS by using Portable Raman Spectrometer



# 1. Japan Central Customs Laboratory

## B) Responsibilities -

1. Standardizing Customs analysis methods and providing chemical analysis services requiring advanced technology
  - Methamphetamine Profiling Program
2. R&D and technical guidance on Non-Intrusive Inspection equipment
  - Portable Raman Spectrometer Initiative
3. Activities as Regional Customs Laboratory (RCL)
  - A set of Coherent Activities as RCL

# 1. Japan Central Customs Laboratory

## C) A set of Coherent Activities as RCL

Since the designation of RCL, CCL set up a network to share information on Customs analysis matters in AP region. In 2016–17, CCL organized “Regional Workshop on Capacity Building of Customs Laboratories for the Revenue Package and Programme and Trade Facilitation” and issued “Collection of Good Practices on Customs Chemical Analysis (Vol.2).” in June 2017.

### Regional Workshop

Date : November 9-11, 2016

Venue : Central Customs Laboratory,  
Kashiwa, Japan

Participants: 23 members in A/P,  
EU, ROCB/AP, Russia, and WCO.

Topics discussed :

- ✓ WCO and HS2017
- ✓ WCO Customs Laboratory Guide and the role of a Customs Laboratory
- ✓ Good Practices on Customs Chemical Analysis, such as oils, fats, polymers.

### Good Practices (Vol.2)

Particular Good Practices on Customs Laboratory Matter:

#### I. Customs Analysis Methods in petroleum and its derivative

1. Analysis Method List from Korea -----	6
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3. Analysis Method and Cases from Japan	
- Quantitative Analysis of Petroleum Oil in Lubricating Oils (No. 301) -----	9
- Quantitative Analysis of Petroleum Oil in Lubricating Oils -----	16
- Quantitative Analysis of Aromatic Compound in Gasoline -----	20
4. Analysis Method from EU -----	26

#### II. Other Good Practices

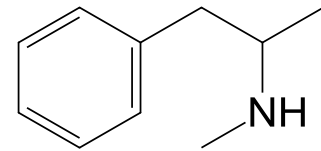
1. Contribution to trade facilitation by managed Customs analysis-----	28
2. Effective use of portable inspection instrument for HS classification purpose -----	28

#### III. Customs Analysis Methods

- Quantitative Analysis of Vitamin E in Vegetable Oils (JCAM No. 107) -----	29
- Analysis of Dairy Spreads (JCAM No. 122) -----	32
- Analysis Method of Peppermint Oil (JCAM No. 302) -----	37

# Our Challenges

- ✓ **Lucrative Market of Methamphetamine**
- ✓ **New modus operandi of Meth. Smuggling**
  - **Aqueous solution**
  - **Derivative/Analog**
- ✓ **New Psychoactive Substances (NPS)**
  - **No appropriate test kits**
  - **Dangerous to human life**



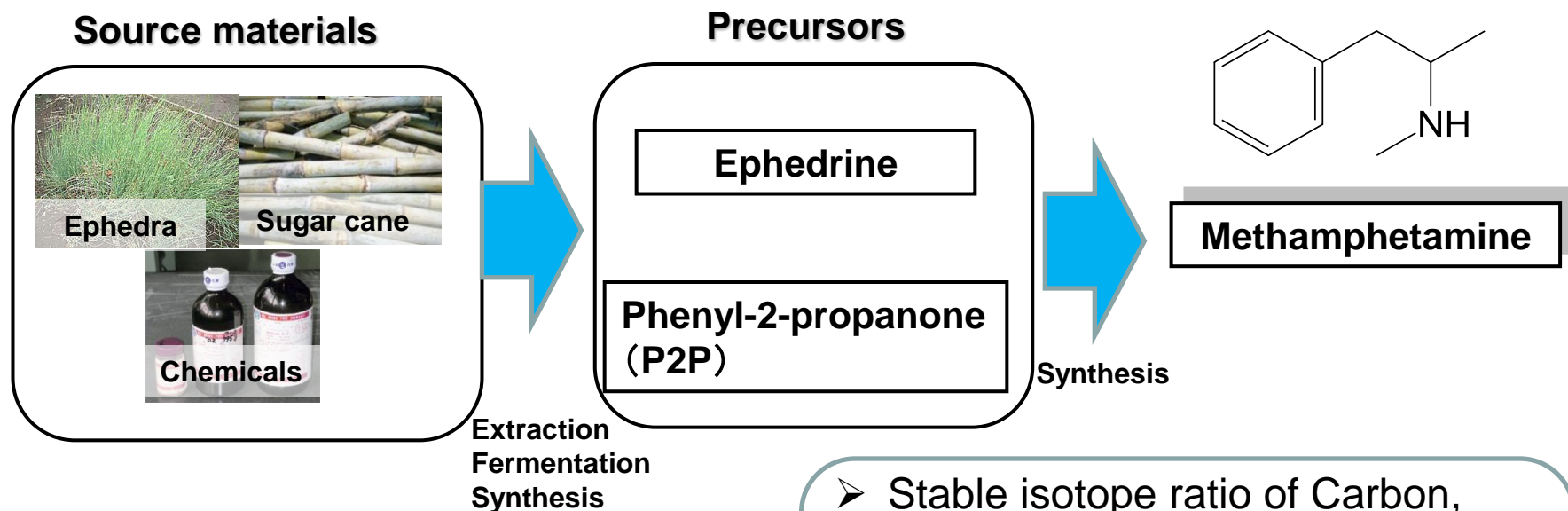
Fentanyl and fentanyl related compounds such as carfentanil

## **2. Providing Intelligence by using Chemical Analysis**

- Methamphetamine Profiling Program -

## 2. Methamphetamine Profiling Program (1)

- Scientific characteristics of methamphetamine differ according to its materials and synthetic methods.
- Profiling analysis is a scientific tool to identify materials, synthetic methods, source regions, trafficking patterns or specific links of cases by revealing the characteristics.  
⇒ **Providing Customs intelligence for Customs enforcement and investigation.**



### Chemical Analysis Methods

- **Stable Isotope Ratio Analysis**
- **Organic Impurity Analysis**
- **Chiral Analysis**

- Stable isotope ratio of Carbon, Nitrogen and Hydrogen constituting methamphetamine maintains that of source materials and can be used to identify source materials and source regions, etc.

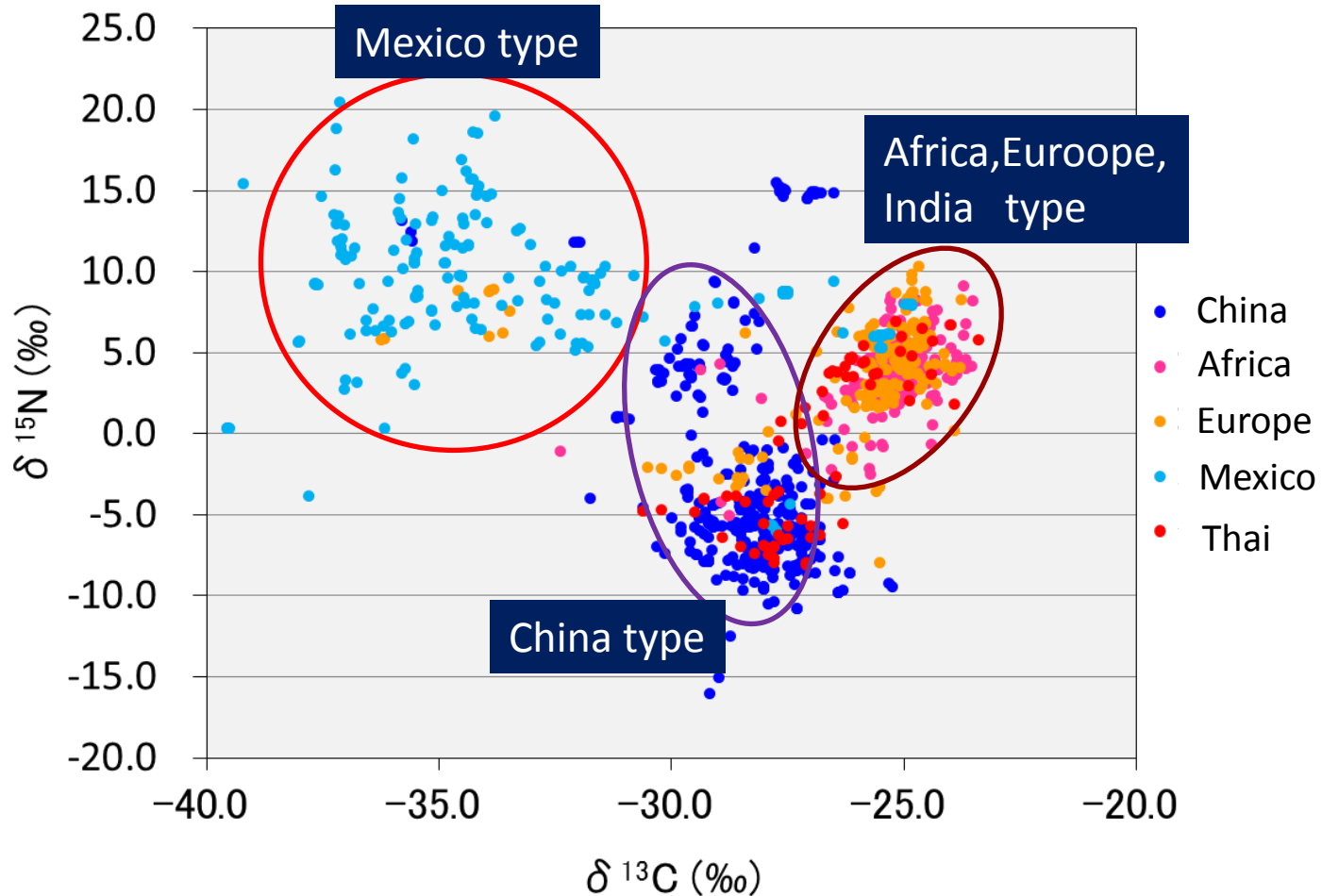
※Such elements as Carbon, Nitrogen or Hydrogen have stable isotopes the mass numbers of which are different. For example, in case of Carbon, few  $^{13}\text{C}$  exists other than  $^{12}\text{C}$  abundant in nature. Stable isotope ratio means the ratio of the stable isotopes,  $^{13}\text{C}/^{12}\text{C}$  in case of Carbon.



## 2. Methamphetamine Profiling Program (2)

### Characteristics of Stable Isotope Ratio Analysis for Methamphetamine from different regions

Methamphetamine samples interdicted by Japan Customs during 2011-2016



Note: Prepared by Japan's Central Customs Laboratory

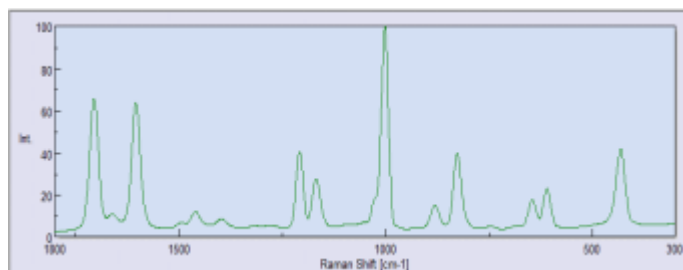
# 3. Fighting NPS by using Portable Raman Spectrometer

- Portable Raman Spectrometer Initiative-

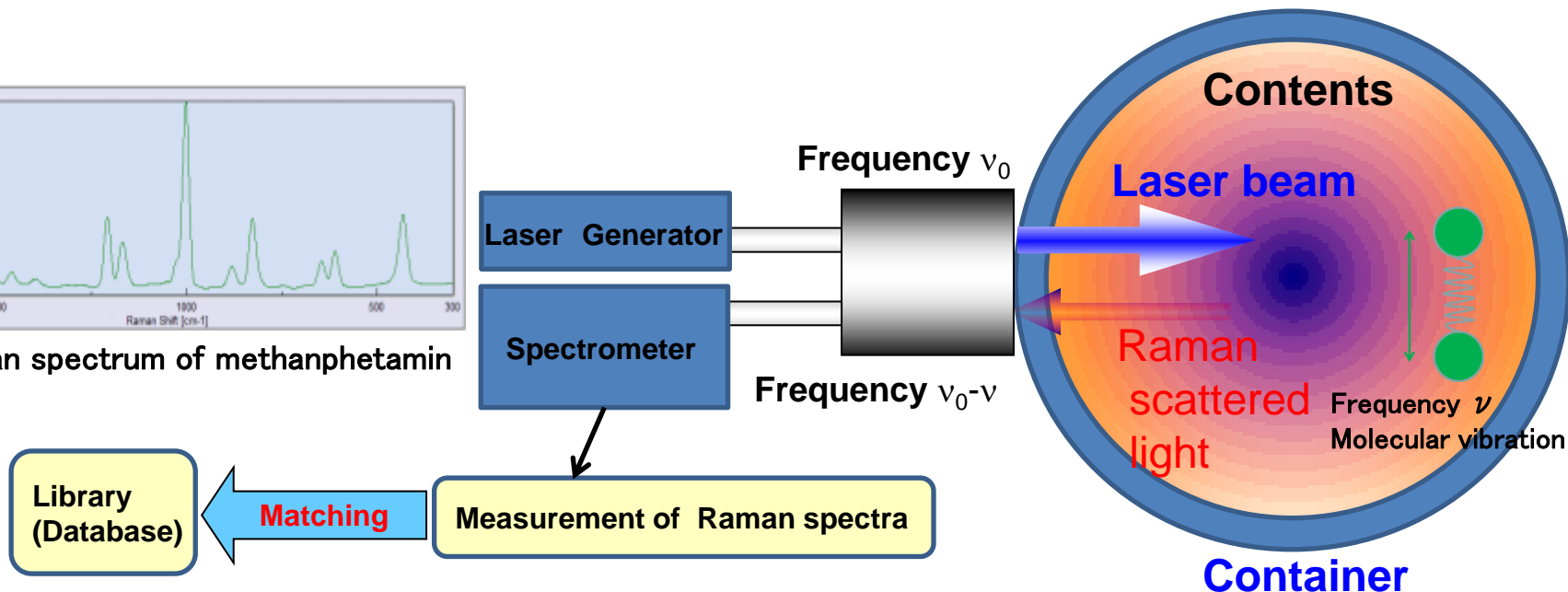
### 3. Portable Raman Spectrometer Initiative (1)

# Principle of Raman Spectrometer Devices

- When a substance is irradiated with laser beam (frequency  $\nu_0$ ), Raman scattered light with a frequency ( $\nu_0 - \nu$ ) different from that of incident light is generated by molecular vibration (frequency  $\nu$ ).
- Measure the spectra of Raman scattered light.
- Since the Raman spectra differs depending on the substance, **by matching with the library (database)**, it enables to identify the substance with high accuracy.



The Raman spectrum of methamphetamine



### 3. Portable Raman Spectrometer Initiative (2)

## Features of Progeny ResQ

- ◆ Measurement of Raman spectra, produced when a laser beam illuminates target materials, enables the device to identify substances in a library (database).
- ◆ Standard library (database) contains spectra for about 12,000 chemical compounds. It includes both spectra for about 460 narcotics, explosives and hazardous materials in total.
- ◆ **Database is Extensible** : Spectra of new materials, such as NPS's standards, can be added.
- ◆ It is applicable for detecting and identifying narcotics and explosives **in powder, tablet or liquid form, packaged in translucent materials or bottles, without opening them.**
- ◆ Measurement time is **10 ~ 30 seconds.**
- ◆ As the result of inspection, the top 5 best matches to reference spectra are shown on the screen (by the chemical names).



**Progeny ResQ**

- Size 29.9 x 8.1 x 7.4 cm
- Weight 1.6 kg

## Advantage of Progeny ResQ

Progeny ResQ uses a laser light with a wavelength longer than conventional ones.

**The accuracy of detecting substances in liquid or colored bottles have been improved!**

# 3. Portable Raman Spectrometer Initiative (3) Effective Use of Extensible Database

New NPS, etc.

Interdiction



Outreach to  
front-liners

Preparing Spectra

If necessary



-User's Manual

Adding Spectra



### 3. Portable Raman Spectrometer Initiative (4)

FYI

## Use for HS classification purpose

## II. Other Good Practices

### 2. Effective use of portable inspection instrument for HS classification purpose

At the WCO workshop, one participant presented the analytical case of yarn sample. He presented that a portable Raman Spectrometer was used to identify the constituent of the sample to determine HS code.

So far in Japan, this instrument has been used only for the detection of illegal drug and explosive by the clearance and inspection sections. The application of the portable instrument for the Customs laboratories to determine HS classification was confirmed effective for the proper HS classification and trade facilitation.

Introducing these instruments for HS classification purpose would be an easier and effective first step for Customs administrations which have been trying to establish their own Customs laboratories.

Extracted from “Collection of Good Practices on Customs Chemical Analysis”

Vol2.

# Conclusion

- **New Technology can enhance Customs capacity.**

	Problems	New Technology	Solution/Innovation
Methamphetamine Profiling Program	-Spreading Smuggling of Methamphetamine	-Chemical Analysis such as Stable Isotope Ratio Analysis	-Identifying Synthetic Methods, Source Regions, or Specific Links among cases, and thus, providing Customs Intelligence
Portable Raman Spectrometer Initiative	-New Modus Operandi of Meth. Smuggling -Increasing of new NPS	-Portable Raman Spectrometer	-Detecting Meth. Smuggling and new NPS

- **Customs chemists/scientists play an significant role to collect various information on new technologies and to realize their effective applications to Customs fields.**



# Thank you for your attention!



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