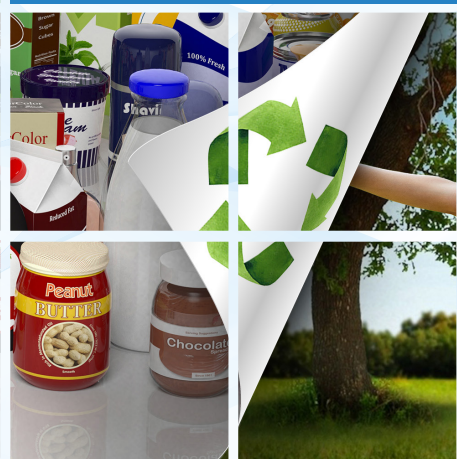


# HORIBA

## Packaging for the Future



**A Challenge for  
R&D and QC**

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**HORIBA**

# Greener plastics and a more circular economy

## A regulatory challenge for the industry

Every year more than 350 million metric tons of plastic materials are produced globally, and most are non-biodegradable. Plastics are indispensable materials in our economy and daily lives, but without sustainable production, from design up to collection, sorting and recycling, they can be an issue for the environment and human health.

Internationally, countries are starting to address the issue of plastics

- **In the EU, the Circular Economy Action Plan (CEAP) and the EU directives apply to Plastic Packaging**

Packaging represents almost 40% of the overall plastic industry and accounts for about 60% of post-consumer plastic waste in the EU.

The 2022 plastic strategy (part of CEAP) aims to accelerate the transition to a circular and resource-efficient and sufficient plastics economy by:

- **reducing** (over)packaging and packaging waste,
- promoting the uptake of **recycled content** in packaging instead of final disposal,
- setting minimum mandatory **green public procurement** criteria and targets for packaging.

- **In North America, California is the first state in the US to act on analyzing microplastics, not just regulate them**

The California Water Board published "Policy Handbook Establishing a Standard Method of Testing and Reporting Microplastics in Drinking Water," in 2022, along with the "Standard Operating Procedures for Extraction and Measurement," by Infrared and Raman spectroscopy of Microplastics in Drinking Water."

The impact will be that only the results from qualified laboratories will be accepted when monitoring microplastics in drinking water, and will be required by the end of 2023.

## Food packaging design

### Creation, analysis and characterization

Product design is one of the key ways to improve packaging recycling. Design improvements can halve the cost of recycling plastic packaging waste.

Over the last 20 years, food packaging has undergone several functional transformations to better preserve quality and extend the food lifecycle, and to optimise packaging costs. Functionality improvements have been achieved through both the use of new materials and optimisation of existing ones. Today this combination of new and existing materials for new packaging results in complex multi-layered structures which may well have 10-15 layers or more, with an overall thickness which may be only a few tens of microns and is decreasing every day.



The new circular economy strategy is now changing the drivers for the packaging companies.

# Create, control, trace and identify

This new circular strategy will bring new challenges to R&D departments and QC labs. They will need more powerful tools to design, analyze, characterize and identify plastics used in packaging. These are complex structures, often with multiple layers of different materials with thicknesses ranging from a few hundred nanometers up to tens of micrometers.



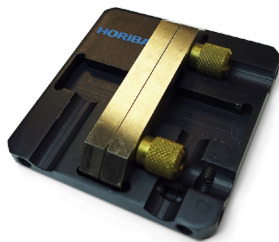
## R&D departments will need to face:

- **Sustainability challenges** with the identification and implementation of recycled plastics
- **New materials formulation** to combine sustainability and performance of multilayered structures
- **Production support** to analyze quickly failures and defects to avoid production delay
- **Safety concerns** on the selection of new material by conducting quick migration studies of new materials

## QC labs will need to face:

- **Identification** of complex multilayered structures and new formulations
- **Daily support** with raw materials and final product testing
- **Production support** to analyze quickly failures and defects to avoid production delays.

To support R&D and QC labs in their new challenges, HORIBA has developed a full solution



A mechanical multi-use tool to hold and cut packaging structures



An intuitive software to automatically provide number and thickness of complex multilayers



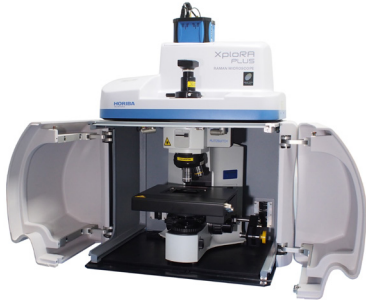
Ultra-fast and powerful Raman instruments

# Raman microscopy for the packaging industry

## The perfect instruments for analyzing multilayers

Raman microscopy, considering its capability to analyze thickness down to 1 micron and below, is the perfect tool to analyze packaging structures.

Raman microscopy helps address all the future challenges of the packaging industry. Some of its advantages are:

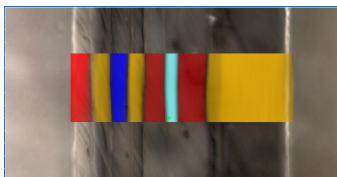


- **High spatial resolution**, key to analyzing multilayer structures where adhesives and coatings are less than 1  $\mu\text{m}$  thick
- **Easy to use** with no or very little sample preparation needed, and no need for a microtome
- **Confocal analysis with 3D imaging** which helps identify inclusions, defects, and components distribution
- Detailed structural and orientation information and insight to crystalline/amorphous nature which are important when working with recycled polymers
- **Helps in migration studies**
- **Easy characterization of inorganic additives**

## Two ways to analyze multilayers

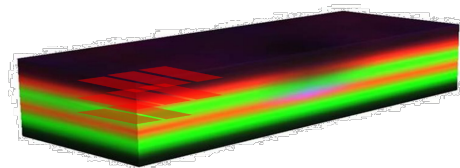
### 1D, 2D or 3D Raman mapping mode

#### Cross-section



- Short sample preparation (polymer cut)
- Fast analysis (minutes)
- Excellent (XY) spatial resolution (down to 0.5  $\mu\text{m}$ )

#### Confocal analysis



- No sample preparation
- Analysis within a few hours
- Very good (Z) spatial resolution (2  $\mu\text{m}$ , 5 times better than traditional techniques)

**Perfect for routine Q&C labs analysis**

**Perfect to understand 3D structure and inclusion studies by R&D departments**

Addressing the new challenges of the plastics circular strategy plan has never been so easy with our combined solutions consisting of the Raman instruments, the layer software app and the polymer multilayer tool.



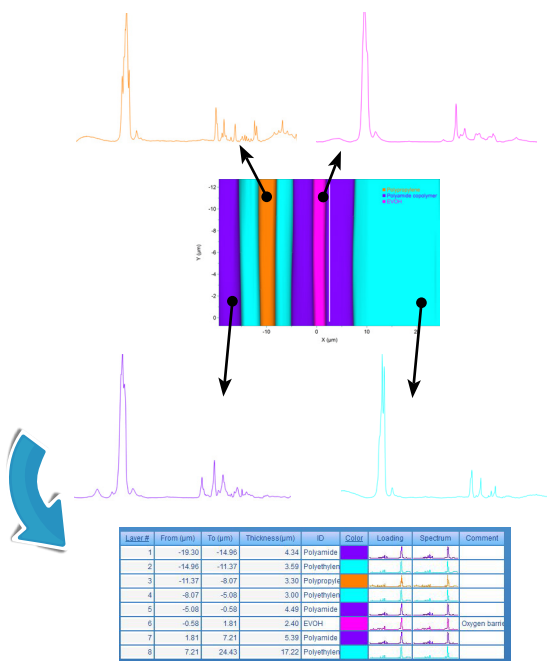
# Fast and easy sample preparation for cross-section analysis

A 2-in-1 tool for cross section analysis of polymers. Sample preparation in 4 steps.



## Cross-section analysis

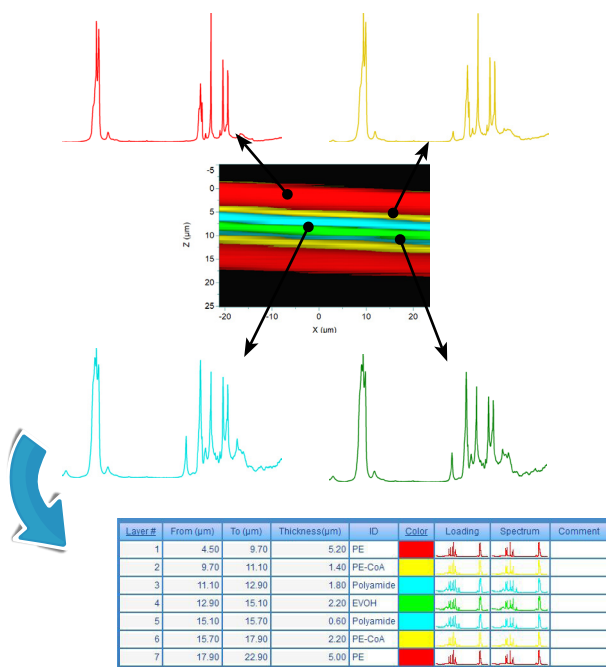
9 layers, 45  $\mu\text{m}$



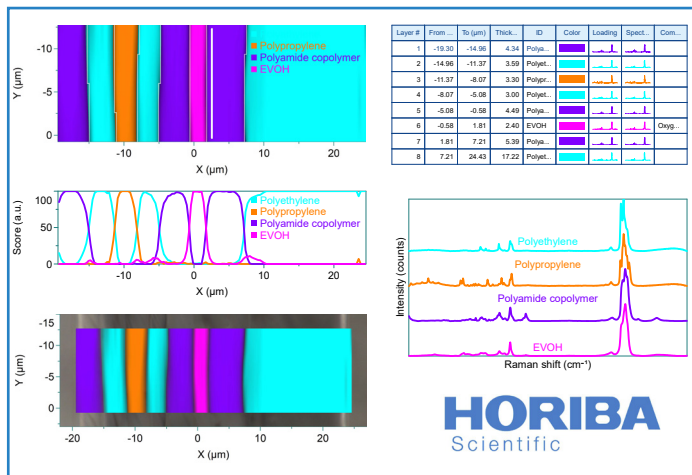
Results table

## Confocal analysis

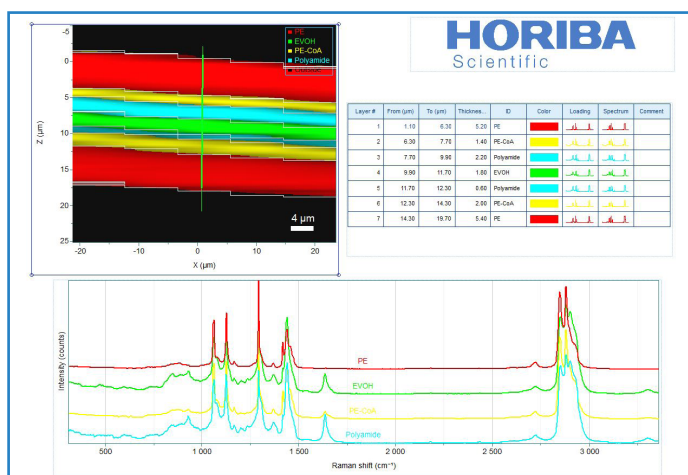
7 layers, 18  $\mu\text{m}$ , 40 min full analysis time



Results table



Analysis report



Analysis report

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