Microplastics Pollution: Assessing Human Exposure through Raman Micro-Spectroscopy

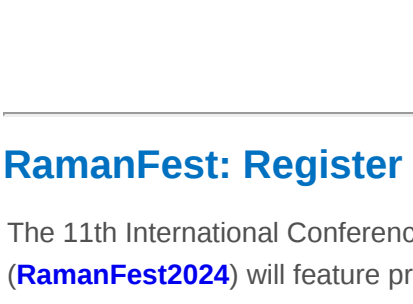
This newsletter highlights the significance of Raman micro-spectroscopy in **analyzing microplastics,** the tiny synthetic polymer particles found in the environment, food, and water. These pollutants potentially pose health and environmental risks by physically accumulating in organisms and/or transporting toxic substances. Smaller particles are especially dangerous due to their ability to penetrate biological systems. Nowadays, scientific efforts focus on monitoring exposure levels and evaluating potential harmful effects.

Raman micro-spectroscopy is crucial for identifying, measuring, and counting microplastics, especially the smallest particles, making it essential for monitoring and managing microplastic pollution.

To learn more on this topic, click here.

Every Breath You Take: High Concentration of Breathable Microplastics in Indoor Environments

L. Maurizi, L. Simon-Sanchez, A. Vianello, A.H. Nielsen, J. Vollertsen



A recent study using Raman micro-spectroscopy assessed airborne microplastic concentrations (>1 µm) in indoor environments. Air samples were collected via a Si membrane and analyzed with an XploRA™ Nano microscope and ParticleFinder™ software, **revealing microplastic concentrations between 58 and 684 MPs per cubic meter**, influenced by human activity, surface area, and air circulation. The estimated human intake was 3,415 ± 2,881 MPs per day. Polyamide (PA) dominated the identified polymers. The study emphasizes the importance of quality control, highlighting the need to distinguish contamination from sample preparation.

The Majority of Potable Water Microplastics Are Smaller Than the 20 µm EU Methodology Limit for Consumable Water Quality

O. Hagelskjær, F. Hagelskjær, H. Margenat, N. Yakovenko, J.E. Sonke, G. Le Roux

The study analyzed microplastic particles as small as 1 micron in **bottled and tap water.** Using chemical digestion and Raman spectroscopy, the authors detected most particles in the 1-20 µm range. The LabRAM™ Soleil Raman microscope and ParticleFinder™ software enabled precise particle detection. The authors recommend updating the EU directive 2020/2184 to include particles below 20 µm in water monitoring and reducing the minimum sampling volume, reflecting realistic human consumption and the method's sensitivity for particle detection.

Detection and Characterization of Small-Sized Microplastics (≥ 5 µm) in Milk Products

P. A. Da Costa Filho, D. Andrey, B. Eriksen, R. P. Peixoto, B. M. Carreres, M. E. Ambühl, J. B. Descarrega, S. Dubascoux, P. Zbinden, A.Panchaud, E. Poitevin

This 2021 study used Raman microscopy to analyze microplastic particles in milk-based products, focusing on **industrial food production.** After enzymatic and chemical digestion to dissolve the organic matrix, the samples were filtered and analyzed with a confocal Raman microscope. Using Raman imaging to scan the filter surface, the method overcame challenges of particle agglomeration and provided precise particle counting. The technique was validated for five polymers, highlighting the need to monitor microplastics in food, not just drinking water, for exposure assessment

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RamanFest: Register now! Don't miss pit!

The 11th International Conference on Advanced Applied Raman Spectroscopy (**RamanFest2024**) will feature presentations from world-leading Raman experts and researchers using the technique across varied applications within life science, materials science, and energy and environmental analysis. It will bring together the world's Raman community to share, learn and discuss how Raman spectroscopy is being applied to today's problems, and pioneering tomorrow's capabilities.

This event is brought to you by the Phantoms Foundation and HORIBA.

When: November 12-13, 2024
Where: Paris/France

Upcoming deadlines
Abstract Submission (Poster request): October 14, 2024
Early Bird Registration Fee: October 14, 2024

Submit your abstract - here

Webinar: Simultaneous structural and chemical characterization with colocalized AFM-Raman

The combination of Atomic Force Microscopy (AFM) and Raman spectroscopy provides deep insights into the complex properties of various materials.

- Raman spectroscopy facilitates the **chemical characterization** of compounds, interfaces and complex matrices, offering crucial insights into molecular structures and compositions, including microscale contaminants and trace materials.
- AFM provides essential data on **topography and mechanical properties**, such as surface texture, adhesion, roughness, and stiffness at the nanoscale.

Speaker
João Lucas Rangel
AFM and AFM-Raman Product Manager

Tuesday Oct 22nd
4: 00- 5:00 PM CEST

Traditionally, users must rely on multiple instruments to gather such comprehensive analysis. HORIBA's AFM-Raman system stands out as a uniquely multimodal tool, integrating an automated AFM with a Raman/photoluminescence spectrometer, providing precise pixel-to-pixel correlation between structural and chemical information in a single scan.

This colocalized approach is particularly valuable in applications such as:

- Polymer analysis, where both surface morphology and chemical composition are critical;
- Semiconductor manufacturing, for detecting defects and characterizing materials at the nanoscale;
- Life sciences, for studying biological membranes, cells, and tissue samples. Additionally,
- Battery research, where understanding both the structural and chemical evolution of materials is key to improving performance.

Register now!

Stay connected!

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