

A CASE STUDY FROM
SPECTRO ANALYTICAL INSTRUMENTS

SPECTRO XEPOS: Achieving beautiful results for cosmetics analysis at L’Oreal

SPECTRO XEPOS Benefits for L’Oreal Research and Development Center

- ▶ Advanced XRF spectrometric screening of natural & conventional materials for cosmetics
- ▶ 3x lower limits of detection (to 1 ppm or lower)
- ▶ Up to 10x higher sensitivity
- ▶ Fast analysis for highest productivity
- ▶ Automatic matrix correction without special calibration
- ▶ Minimal learning curve
- ▶ Ensured ease of use
- ▶ Nondestructive analysis for limited quantity samples
- ▶ Lower cost of ownership



Photo: L’Oreal Research & Innovation

The Challenge

L’Oreal is dedicated to offering “Beauty for all.”

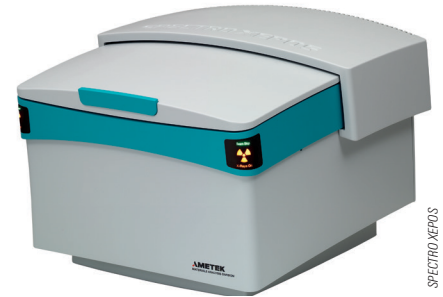
To that end, 900 employees at the giant cosmetics firm’s Center for Research and Innovation in Chevilly Larue, France — just south of Paris — help create new developments in makeup, skincare, suncare, fragrances, and hygiene. An expert team in the analytical department conducts spectrometric analyses of finished goods and raw materials. Among other tasks, the scientists must help choose the optimum raw materials for creating the best finished products in term of diversity and quality, without compromising safety. This involves analysis of heavy metals and other elements.

One standard tool in long-time use at L’Oreal: an inductively coupled plasma mass spectrometer (ICP-MS). Its operation requires fairly elaborate sample preparation (e.g., multi-hour digestion via strong nitric acid) and significant consumption of argon. Though expensive and time-consuming, ICP-MS technology gives unsurpassed accuracy for random-sample analyses of conventional cosmetic ingredients.

However, consumer demand for natural cosmetics continues to grow. And trace-element allergens or toxins can be a concern with these products’ vegetable raw materials. Elemental concentrations vary more from batch to batch than with conventional ingredients. Traces of elements such as bioaccumulative or sensitizer metals (lead, antimony, nickel, etc.) may be introduced into plants from soils, fertilizers, or irrigation, as well as during harvesting or processing.

“We needed a quicker method to screen for the possible presence of heavy metals in these raw materials especially,” says Dr. Matteo Tonelli, one of the team’s analytical chemists.

The team evaluated several brands of energy-dispersive X-ray fluorescence spectrometers. (ED-XRF analysis delivers substantially better speed and throughput than ICP-MS, at much lower cost.) One SPECTRO model displayed key advantages — including exclusive software to automate matrix corrections. Also, SPECTRO let the team try out the instrument at L’Oreal for 2 weeks: the first manufacturer that offered this kind of unsupervised trial.



The Solution

In March 2018, the L’Oreal center installed the latest SPECTRO XEPOS HE high-performance ED-XRF spectrometer.

Besides average limits of detection 3x lower than previous models, the analyzer’s quantum improvements in excitation, detection, and calculation help yield 3x greater precision. Its redesigned operating software offers exceptional ease of use. And its unique TurboQuant II tool delivers automatic matrix correction — for trace element accuracy down to 1 ppm or less, out of the box.

The Results

SPECTRO XEPOS’s analysis speed, minimal sample prep, easy-to-use software, and lack of calibration delays have afforded the L’Oreal team a truly beautiful boost in productivity.

“We’ve screened a huge number of natural raw materials recently — from algae to honey to olive oil to flower leaves,” says Dr. Tonelli. “At about 15 minutes per sample, to ensure the lowest ppm. And we can now be confident that, let’s say, 96 percent presented no traces in the ppm range of elements to concern us. To

analyze all that using ICP-MS, we would have needed months to obtain the same answer!”

He sees SPECTRO XEPOS as a critical complement to the lab’s ICP-MS analyzer. “We cross-check the statistical base of XRF results with MS results. And can confirm that the SPECTRO TurboQuant software provides good correlations.”

Other benefits really add up. “Due to the wide variety of raw materials that can be used in cosmetics, we have to screen several different kinds of matrices. TurboQuant means we are not obliged to make a calibration for every change in the matrix. And the software is quite intuitive: probably an hour is enough to teach somebody to get a preliminary result. So SPECTRO XEPOS lets us consume less argon, reduce the consumption of strong acids — and free up more time. It’s vital to us as a screening tool. If more than screening analysis is required, we can optimize the method using matrix-matching reference samples to further improve accuracy.”

The analyzer should have an exciting future at L’Oreal. “We’re developing methods and increasing our knowledge of the technique with all kinds of different matrices,” says Dr. Tonelli. “The plan is to exploit the full potential of the instrument.”

About L’Oreal

The world’s largest cosmetics company, L’Oreal has devoted itself to beauty for more than 100 years. It employs 82,600 people worldwide, serving 130 countries on 5 continents. In its global Research and Innovation department, a dedicated team of 3,870 works to meet worldwide aspirations for beauty.

About SPECTRO

SPECTRO is one of the world’s leading suppliers of analytical instruments. Its analyzers use optical emission spectrometry (arc/spark OES, ICP-OES), X-ray fluorescence spectrometry (XRF), and inductively coupled plasma mass spectrometry (ICP-MS) technologies in the elemental analysis of materials for industry, research, and academia..

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