CASE STUDY: IDENTIFYING A SPECIFIC INDUSTRIAL SOURCE OF FINE PARTICLES THROUGH AUTOMATED MORPHO-CHEMICAL CHARACTERIZATION

Client: Environmental authority

Mission:
The initial goal was to conduct morpho-chemical characterization and source attribution of PM_{10} and $PM_{2.5}$ particles collected at a mobile air monitoring station, in order to better understand the influence of local emission sources. During the study, however, an unusual particle signature was discovered, shifting the focus toward identifying a previously unknown industrial source.
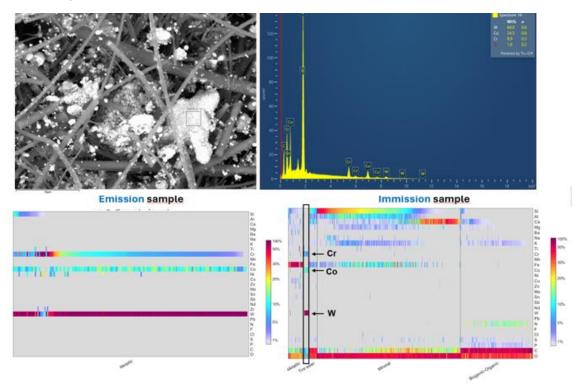
Challenge:
The particle samples contained atypical compounds with elevated levels of tungsten (W), cobalt (Co), and chromium (Cr)—metals not typically associated with traffic-related emissions. The main challenge was to clearly attribute these specific particles to one source among several possible industrial emitters.

Solution:
Particles were collected through both active and passive sampling and characterized morpho-chemically using ASPA MC²®, our automated single-particle analysis method supported by machine learning. The particle fingerprints were then matched against emissions from surrounding industrial facilities, allowing for the clear identification of the emission source.

Added Value and Impact:

The distinct morpho-chemical signature enabled accurate source attribution to a specific industrial facility. Following the installation of an appropriate filtration system, follow-up measurements confirmed success: the metal particles completely disappeared from the ambient air. The authority gained a solid basis for regulatory action and for the long-term monitoring of similar emissions.

Particle Vision GmbH
Phone: +41 76 513 70 30
E-Mail: info@particle-vision.ch