A CASE STUDY FROM
SPECTRO ANALYTICAL INSTRUMENTS

From Classroom to Fieldwork: How Hochschule Niederrhein Advances Research and Education with SPECTRO

SPECTRO XEPOS Advantages for the Hochschule Niederrhein

- Enables high-precision analysis of solid samples with minimal preparation
- Supports diverse research applications, including archaeometry and environmental forensics
- Delivers representative results from large sample masses
- Integrates seamlessly into academic teaching and thesis work

SPECTRO xSORT Advantages for the Hochschule Niederrhein

- Provides immediate, in-situ elemental analysis for mobile applications
- Ideal for pigment classification and historical material studies
- User-friendly interface supports student engagement and independent research
- Enhances flexibility in environmental monitoring and field-based projects



Photo: Prof. Dr. Jürgen Schram

The Challenge

At Hochschule Niederrhein, the Department of Instrumental and Chemical Analytics faced the dual challenge of advancing both academic instruction and applied research in elemental analysis. The laboratory, led by Prof. Dr. Jürgen Schram, requires analytical instruments capable of delivering precise, reproducible results across a wide range of sample types, including ceramics, pigments, polymers, environmental materials, and historical artifacts. The complexity of these materials demanded a method that could handle heterogeneous matrices with minimal sample preparation while maintaining sufficient analytical accuracy.

In addition to research demands, the institution prioritized hands-on education in instrumental analytics. However, limited access to advanced instrumentation pose obstacles to student engagement. The need for robust, user-friendly systems that could be integrated into structured coursework and independent research is essential. Furthermore, the lab seeks to expand its capabilities in response to evolving trends and applicant demands by incorporating mobile and field-based analysis, particularly for environmental and archaeometric applications, while maintaining high data quality standards.



The Solution

To address these requirements, Hochschule Niederrhein integrated two energy-dispersive X-ray fluorescence (ED-XRF) spectrometers from SPECTRO into its laboratory infrastructure: the SPECTRO XEPOS and the handheld SPECTRO xSORT. These instruments were selected based on their analytical performance, operational reliability, and the institution's longstanding collaboration with SPECTRO, which included prior experience with SPECTRO ICP systems.

The SPECTRO XEPOS was deployed for high-precision elemental analysis of solid samples, supporting projects such as the classification of ceramics, plastics, the assessment of environmental degradation in historical structures, and studies on trace element enrichment. Its ability to analyze large sample masses with minimal preparation enabled the generation of representative data, particularly valuable in environmental and historical research contexts.

The SPECTRO xSORT expanded the lab's capabilities into portable, in-situ analysis. It was used for pigment classification, the examination of historical books, documents and materials, and mobile environmental monitoring. Its intuitive interface and immediate results made it suitable for both research and educational use, particularly in the Master's program and in the student-led research group AG Chemical Detectives.

Both instruments were integrated into practical coursework, enabling students to gain direct experience with advanced analytical techniques. The software's ease of use and the systems' operational stability facilitated their adoption in both structured experiments and exploratory research.

"The cooperation with SPECTRO is always very good and productive. The devices are reliable, robust, and are among those with the fewest failures", states Prof. Dr. Schram.

The Results

The implementation of SPECTRO XEPOS and SPECTRO xSORT significantly enhanced Hochschule Niederrhein's analytical capabilities. The instruments delivered high-quality, reproducible results with minimal calibration and sample preparation, streamlining workflows and increasing throughput. Their versatility supports a broad spectrum of applications, from environmental forensics to archaeometry and historical material analysis.

Educational outcomes improved as students engaged with real-world analytical challenges using industry-standard equipment. The systems' reliability and user-friendly design enabled their integration into both foundational and advanced coursework, fostering technical competence and scientific curiosity. Research output increased, with numerous Bachelor's and Master's theses incorporating data generated from the SPECTRO instruments.

Notable projects included the analysis of sediment samples from archaeological excavations, environmental assessments of historical building materials, and fingerprinting studies using handheld devices. "One highlight certainly was the analysis of sediments after the finding of remains of a flat-bottomed boat from the early 18th century in Düsseldorf Kaiserswerth", remembers Prof. Dr. Schram. These applications demonstrated the instruments' adaptability and relevance across disciplines.

Operationally, the instruments proved robust and dependable, with minimal downtime and strong technical support from SPECTRO. While earlier software versions presented limitations in data export functionality, ongoing updates and responsive service ensured continued usability. The institution is currently evaluating potential upgrades and further collaboration with SPECTRO, recognizing the instruments' role in supporting future innovation in both teaching and research.

About the Hochschule Niederrhein

The Department of Chemistry at Hochschule Niederrhein is the largest of its kind at the universities of applied sciences in Germany. It is a renowned educational and research institution in the German university landscape. With ten faculties, campuses in Krefeld and Mönchengladbach and more than 12,000 students, the Hochschule Niederrhein is an important contact for companies in the region when it comes to research and transfer.

About SPECTRO

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

CONTACT US

REQUEST A QUICK QUOTE

REQUEST A FREE DEMO

RESOURCE LIBRARY

FEEDBACK

www.spectro.com

GERMANY
SPECTRO Analytical Instruments GmbH
Boschstrasse 10
D-47533 Kleve
Tel. +49.2821.892.0
spectro.sales@ametek.com

U.S.A.
SPECTRO Analytical Instruments Inc.
50 Fordham Rd
Wilmington 01887, MA
Tel. +1 800 548 5809
+1 201 642 3000
spectro-usa.sales@ametek.com

CHINA
AMETEK Commercial
Enterprise (Shanghai) CO., LTD.
Part A1, A4 2nd Floor Building No. 1 Plot Section
No. 526 Fute 3rd Road East; Pilot Free Trade Zone
200131 Shanghai
Tel. +86.400.022.7699
spectro-china.sales@ametek.com

Subsidiaries:
▶**FRANCE:** Tel. +33.1.3068.8970, spectro-france.sales@ametek.com ▶**GREAT BRITAIN:** Tel. +44.1162.462.950, spectro-uk.sales@ametek.com
▶**INDIA:** Tel. +91.22.6196.8200, sales.spectroindia@ametek.com ▶**ITALY:** Tel. +39.02.94693.1, spectro-italy.sales@ametek.com
▶**JAPAN:** Tel. +81.3.6809.2405, spectro-japan.info@ametek.co.jp ▶**SOUTH AFRICA:** Tel. +27.11.979.4241, spectro-za.sales@ametek.com

SPECTRO operates worldwide and is present in more than 50 countries. For SPECTRO near you, please visit www.spectro.com/worldwide

© 2025 AMETEK Inc., all rights reserved, subject to technical modifications • G-25, Rev. 0 • Photos: SPECTRO, Adobe Stock
Registered trademarks of SPECTRO Analytical Instruments GmbH • SPECTRO: USA (3,645,267); EU (005673694); "SPECTRO": EU (009693763)
"SPECTRO XEPOS": Germany (39851192), USA (2,415,185); "xSORT": USA (IR 3,767,555); Japan, China (IR 978 588); EU (007058456)