

Automated, In-Line Hexavalent Chromium Analyzer

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OndaVia technology

Wide ranging water analysis technology with benchtop and online capabilities. Over 100 systems deployed and over 25 US Patents issued



Metals

Selenium (VI)

Chromium (VI)

Lead

** in development*

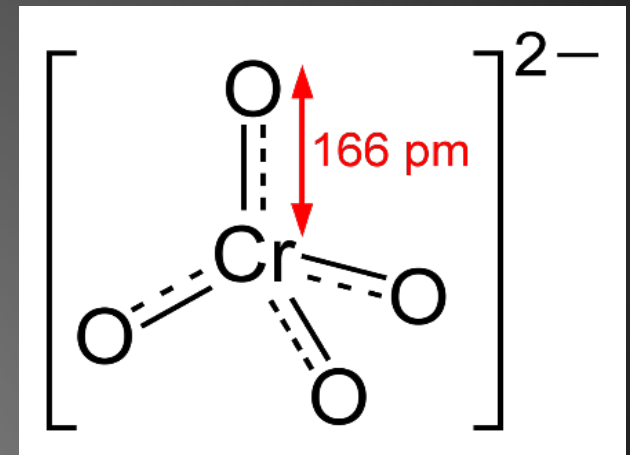
*Uranium**

*Cadmium**

Iron

Chromium

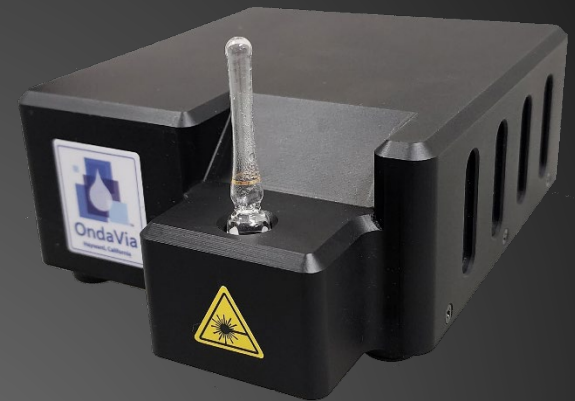
- Total chrome regulated at 50- to 100-ppb
- Trivalent chromium
 - Insoluble at high pH
 - And (potentially) an essential nutrient
- Hexavalent chromium (chromate)
 - Highly water soluble
 - And carcinogenic
- California
 - Cr(VI) is regulated at 10-ppb
 - Public health goal is 0.02-ppb



Chromate

Raman spectroscopy

optical technique used to observe vibrational, rotational, and other low-frequency modes in a system
commonly used for chemical identification

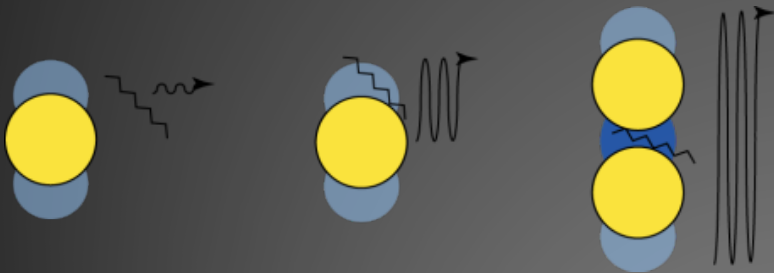


But only 1 in 10 million photons, too weak for trace-level environmental analysis

Enhanced Raman Spectroscopy

Surface-Enhanced Raman Spectroscopy (SERS)

Enhancement over “normal” Raman of up to 10^{10}



Use gold nanoparticles to enhance the Raman signal

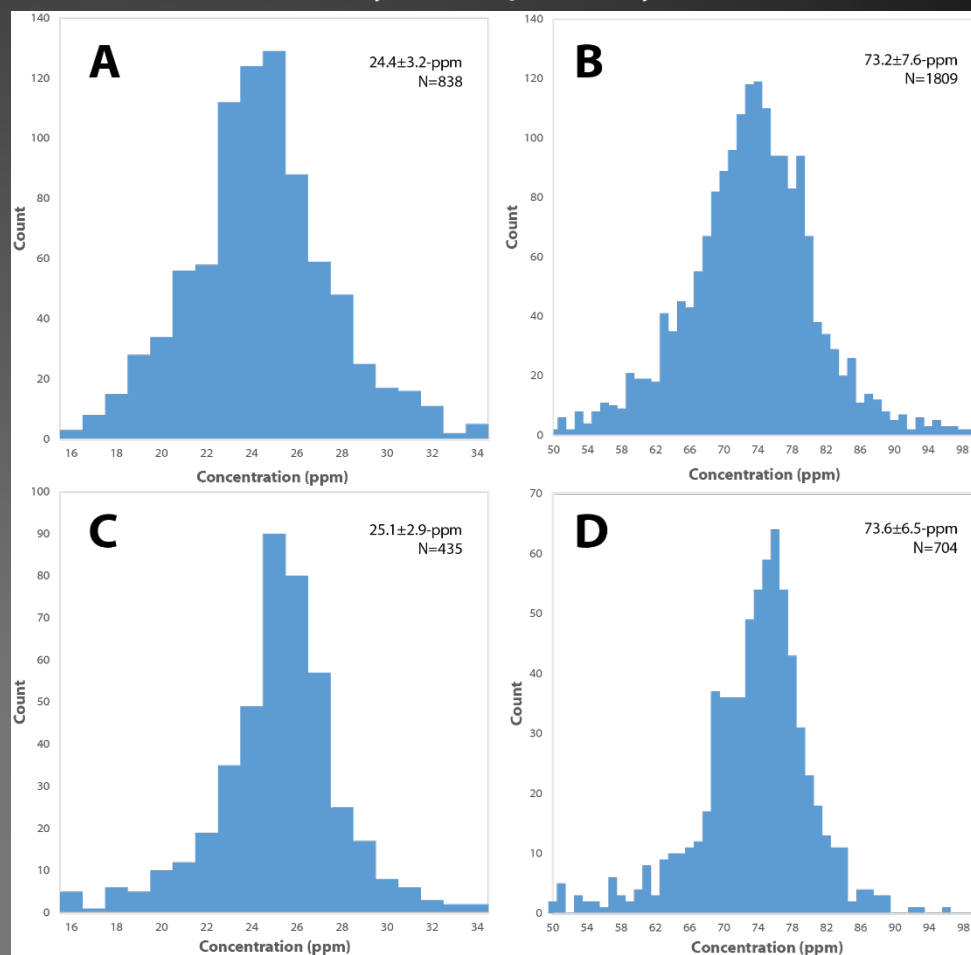
Achilles' heel: *reproducibility*

- Variations in substrate properties
- Stochastic nanoparticle alignments
- Changes to the optical system (laser power, focus, position)

Internal standards

- Internal standards make Raman spectroscopy a quantitative method
- Organics? Deuterated compounds
- Oxyanions (like chromate)? Heavy oxygen isotopologue: Cr^{18}O_4

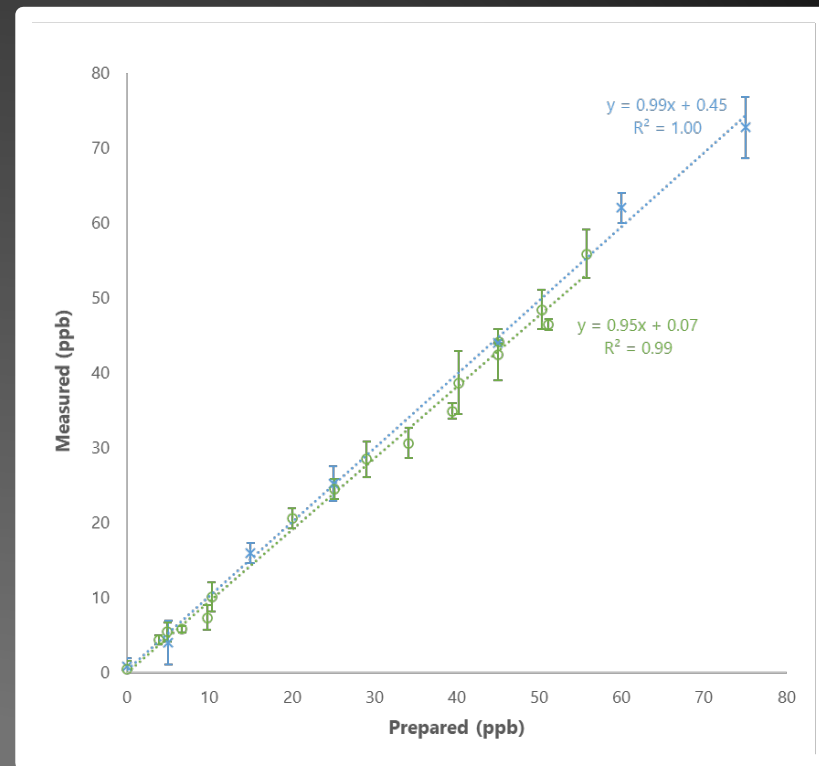
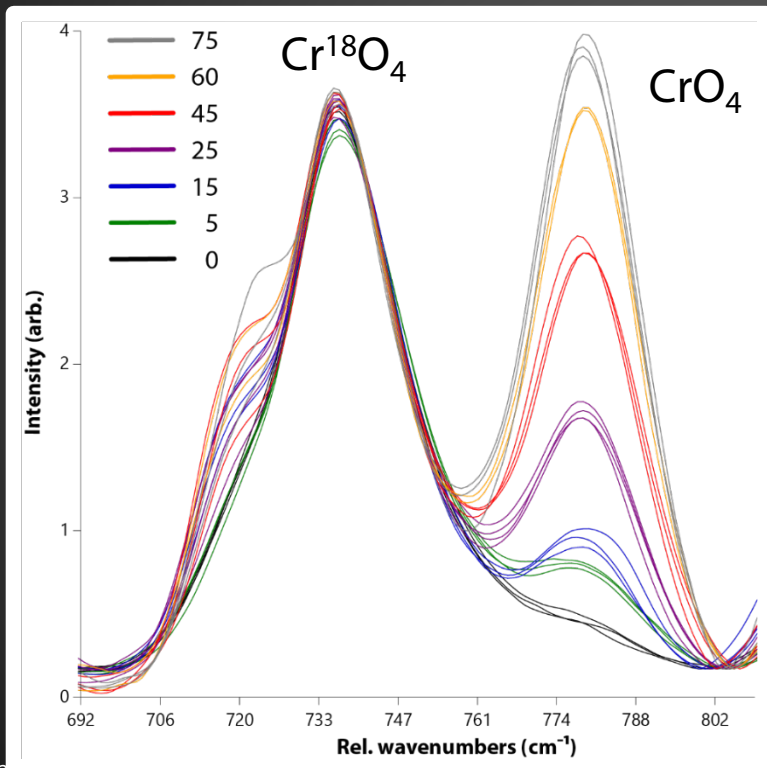
Quantitative analysis of primary amines



Chromate analysis

Method

- Add Reagent 1 (internal standard)
- Add Reagent 2 (linker)
- Add AuNPs

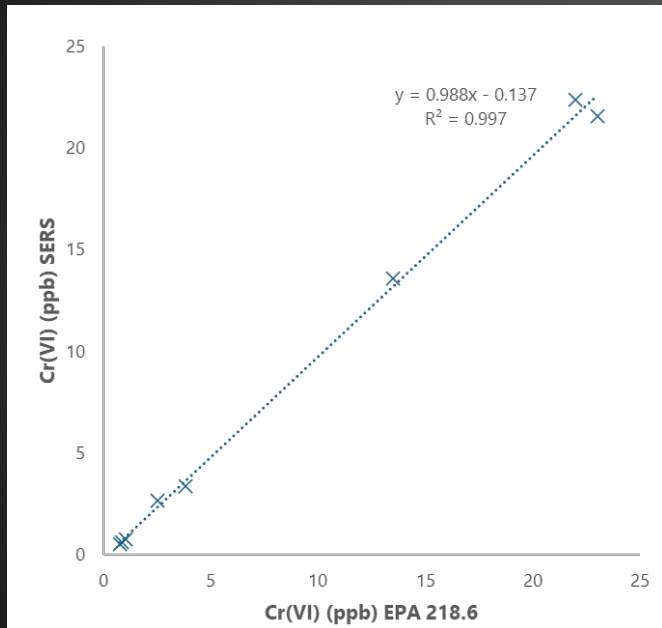


MDL: 3.9-ppb

MQL: 7.0-ppb

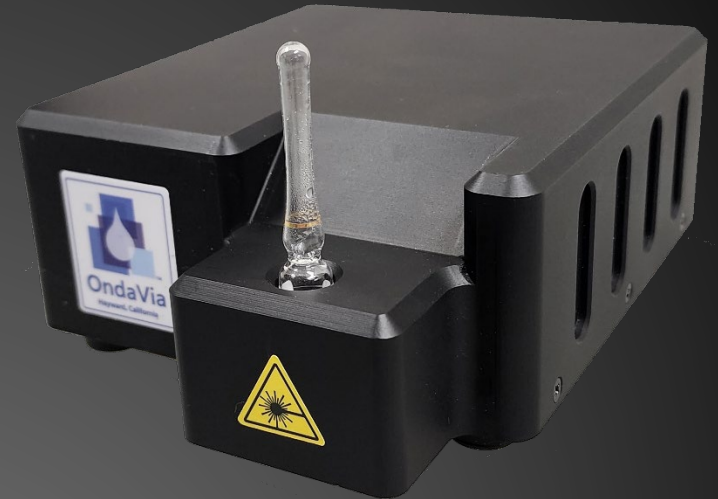
Microvi and OndaVia

Rapid, in-field testing
enables treatment process
optimization



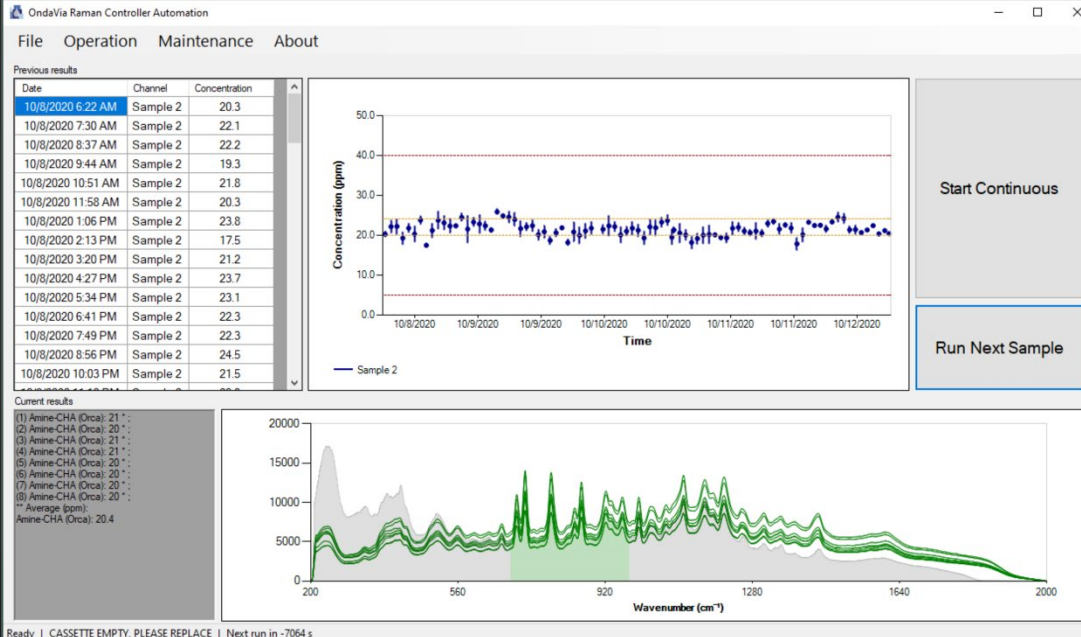
OPAL™ platform

- OPAL-106 Metals Analysis System
 - Portable
 - Maintenance-free
- OV-OP-B006-PPB Hexavalent Chromium Kits
 - 5- to 100-ppb range
 - <5 minutes per test
 - Easy to use



ORCA™ platform

- Automate sample preparation
- Use large volume reagent cassettes



Questions?

Thanks to...



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Grant Information	Peterman, Automated, In-Line Hexavalent Chromium Analyzer , OndaVia, Inc., R44ES035679
Presenter	Mark Peterman, CEO
Technology Name and Description	<p>Online and benchtop hexavalent chromium analysis</p> <p>This technology adapts Surface-Enhanced Raman Spectroscopy for quantitative chemical analysis.</p>
Innovation	OndaVia's Quantitative Raman Spectroscopy technology enables rapid, on-site, laboratory-grade hexavalent chromium analysis, distinguishing it from slower, expensive, and lab-dependent methods like ICP/MS. The highly adaptable platform is available as both portable benchtop units for field use and automated on-line systems for continuous process monitoring. The system offers significant savings by delivering results in minutes at a fraction of the cost of traditional lab tests, which can be hundreds of dollars per sample. This unique approach is secured 27 granted US Patents for analytical methods and instrumentation.
Contaminant and Media	<p>Hexavalent chromium in groundwater, wastewater, and drinking water</p> <p>Sub-5-ppb LOD</p> <p><5 min / test, \$30 / test consumables (benchtop), <\$2/test (online)</p>
Technology Readiness Level	Benchtop: TRL 9; Inline: TRL 7
Site Work	n/a
Main Point of Contact and Social Media	<p>Mark Peterman, CEO. 510-576-0476, info@ondavia.com</p> <p>https://www.ondavia.com</p> <p>https://www.linkedin.com/company/ondavia-inc./</p>
Graphics (s)	