



MATERIALS SCIENCE | PURITY CERTIFICATION AND TRACE ANALYSIS OF TITANIUM

How do you drive precision and performance, and at the same time ensure safety and durability? How do you make aircraft structures lighter? How do you make engines more efficient? How do you drive R&D productivity while keeping up with regulatory demands?

PURITY CERTIFICATION AND TRACE ANALYSIS OF TITANIUM: HOW WE CAN HELP

With more than 20 years of experience in purity certification and trace elemental analysis of titanium and alloys following ASTM Test Methods, EAG Laboratories offers the perfect combination of industry-best detection limits, long-term reproducibility, and fast turn around time to help support R&D, production QC and failure analysis for titanium manufacturers and users. A ISO9001, ISO17025 and Nadcap-accredited laboratory, EAG offers chemical composition, structural, ion release, thermal, out-gassing and metallurgical analysis of titanium and alloys (such as Ti-6Al-4V, Nitinol, etc.)

PURITY CERTIFICATION OF 6N+ TITANIUM WITH GDMS

The chemical composition of inorganic solid samples is directly analyzed using glow discharge atomization / ionization sources combined with high mass resolution analyzers (Glow Discharge Mass Spectrometry or GDMS). The sensitivity, ease of quantification and the robustness to analyze a wide variety of samples make GDMS an ideal choice for determination of trace and ultra-trace level impurities.

GDMS offers

- Full periodic table coverage
- Direct sampling from solids
- Minimal sample preparation requirements
- Industry accepted, state of the art analytical technique
- ASTM procedure (ASTM Test Method F1710-97)
- CRM and RM traceable analyses
- Characterization of high purity Titanium (6N+) and Titanium alloys

GDMS also offers the ability to conduct depth specific information analyses

SUPPLIER SCREENING AND FAILURE ANALYSIS

EAG has a range of analytical instrumentation that is applicable for failure analysis. The techniques include Optical Microscopy, SEM/EDS, FTIR, Raman, TOF-SIMS, XPS, and Auger Spectroscopy. We also work with experts in metallurgical failure analysis and fracture analysis to better understand the mechanics of the fracture, failure modes and origins.

- **Improve Consistency and Reliability:** GDMS's ability for high sensitivity, full survey of deleterious impurities enables direct "Lot-to-Lot" comparison essential to maintain the long-term consistency and reliability of titanium-based products
- **Total and Fractional Hydrogen Analysis:** EAG offers IGA technique to determine the total and fractional hydrogen in titanium and alloys relating to hydrogen embrittlement issues.
- **Outgassing Analysis:** EAG offers outgassing analysis (up to 1500 °C) to identify evolved organic contaminants and inorganic residual gases (H₂O, CO₂, HCl, SO₂, etc.) in large titanium parts, and in titanium powder and thin wires for additive manufacturing.

MATERIAL SCIENCE SERVICES:

Our scientists and metallurgical experts utilize multiple analytical approaches to detect and solve problems such as:

- Fracture failure modes and origins
- Fatigue and other slow crack growth mechanisms
- Brittle and ductile failures
- Stress corrosion cracking and hydrogen embrittlement failures
- Corrosion and oxidation problems
- Contamination problems
- Heat treatment problems
- Plating and surface finishing problems
- Welding, brazing and soldering problems
- Purity evaluations of precious metals
- Alloy determination and classification
- Conformance testing to international or industrial standards
- Lot-to-lot material comparisons for quality assurance
- Oxygen content measurement and certification of oxygen-free materials
- Design and materials selection
- Qualification of AM feed powders
- Comparisons of conforming vs. nonconforming materials
- Process monitoring of dopant/additive levels
- Examination of grain size and structure and grain boundary analysis
- Vendor comparison studies through metallurgical analysis
- Purification process evaluations
- Surface cleanliness of metals to monitor cleaning methods
- Thickness of surface oxides in passivation layer
- Assessment of Nickel and Titanium Ion Release from biomedical devices
- Thickness of surface oxide passivation layer
- Passivation layer thickness on medical implant materials
- Surface Pb concentration determination for biomedical applications
- In situ fracture analysis of cleaved surface
- Material hardness testing

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