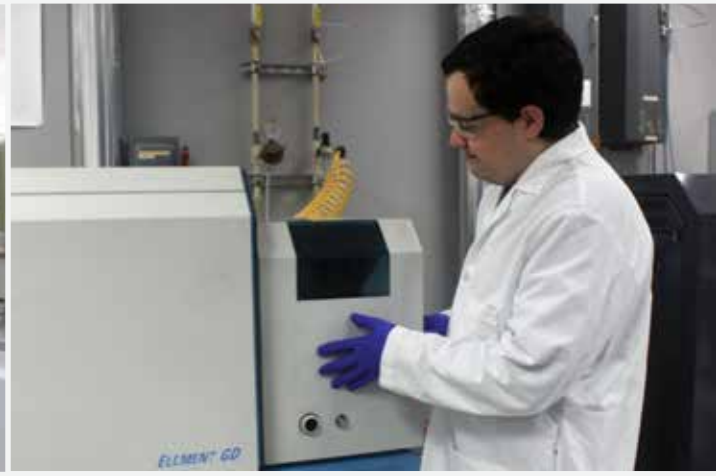


PURITY MATTERS

REDEFINE HIGH PURITY ANALYSIS AND DRIVE TECHNOLOGY INNOVATION

EAG LABORATORIES

A EUROFINS COMPANY

Purity Matters

The type, concentration and spatial distribution of impurities are of particular concern to many advanced technologies, including but not limited to advanced metal alloys and ceramics, sputter targets, semiconductors, optics, medical devices, pharmaceuticals, batteries, sensors, catalysts, in additive manufacturing, in electronics, in aerospace, in nuclear energy industry, and in quantum computing. The success of these technologies and industries relies on the high purity feedstock (e.g., 99.995% + purity) and contamination-free processing and engineering.

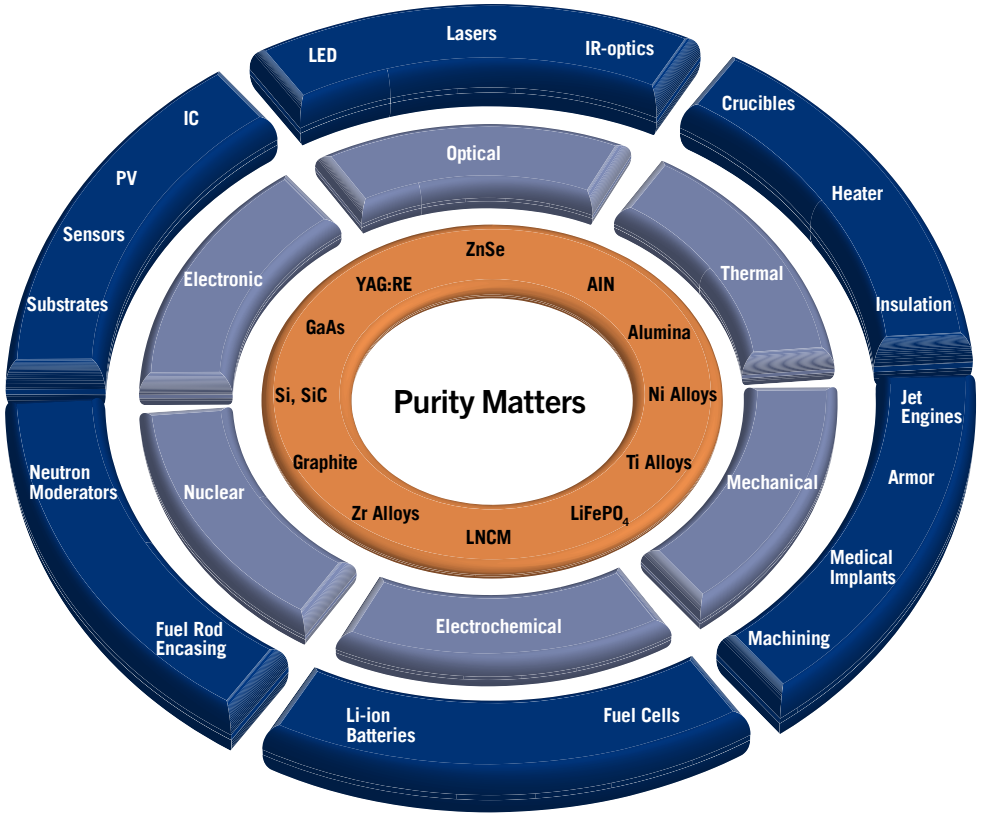
Facts

- Real materials are not pure! They contain various impurities.
- Impurities introduce new energy levels and defects to materials, leading to desired and/or unintended changes in materials chemistry and physical properties.
- Contamination is often thermodynamically and kinetically favorable.
- Distribution of impurities is driven by a variety of mechanisms, including sorption, dissolution, diffusion, segregation, precipitation, and trapping.

Impurity Roles and Classification

Impurities play a variety of roles, affecting the performance, the reliability and the lifetime of many materials, parts and devices, particularly under dynamic load, extreme environment or harsh conditions.

- Nuclear impurities – neutron absorbers, moderators, and reflectors
- Electronic impurities – dopants, deep trappers, and recombination centers
- Optical impurities – absorbers, scattering centers, and chromophores



From feedstock to field failure, purity matters through the entire product lifecycle!

- Chemical impurities – catalysts, poisoners and inhibitors in conventional chemistry, biochemistry and electrochemistry
- Structural impurities in engineering materials – low melting point phases, sintering aids, inclusions, strengtheners, grain refiners, and grain boundary binders
- Nucleation seeds during crystal growth

Why Choose EAG Laboratories for Trace and Purity Analysis?

EAG Laboratories has been a trusted, long-standing partner in high technology industries. Over the past three decades, we have established a full suite of trace analysis services that feature advanced analytical techniques, a comprehensive reference material database, highly educated staff leveraging scientific expertise for problem solving, and a rigorous data security and IP confidentiality practice.

Quality

EAG Laboratories implements a quality management system, allowing for traceable and transparent development protocols.

- ISO 9001:2015; ISO 17025:2017
- Nadcap
- ASTM, USP and ISO standard testing methods
- DLA suitability for MIL-STD 883/750

Solid Sampling Trace Analysis	Solution Sampling Trace Analysis	Outgassing Analysis
GDMS	ICP-MS	RGA-EGA
Laser Ablation ICP-MS	ICP-OES	TGA-IR/MS
ETV-ICP-OES		DIP-MS
LIBS		
IGA		

Global Support

As the global leader in materials and engineering sciences, EAG supports thousands of clients with 20+ facilities located in the US, Europe and Asia.

EAG is the leading GDMS service provider. We have 25 high-mass resolution GDMS instruments installed globally to provide uninterrupted purity certification services.

Comprehensive Trace Analysis Services

Our trace analysis capability includes both Direct Solid Sampling and Solution Sampling techniques. In addition, EAG offers diverse outgassing analysis services. These techniques are used for production support, R&D, failure analysis and litigation support.

- Full survey trace analysis and purity certification of high purity solids and liquids (70+ elements)
- High performance ICP-OES analysis for accurate composition determination
- Depth specific impurity distribution measurement in thin films and coatings
- 2D- and 3D-mapping of impurities in solids
- Outgassing analysis and thermal analysis
- Gas analysis in hermetic devices (e.g., medical implants)
- Reference material development





Trusted and Proven Partner

Purity Survey at EAG is an industry benchmark for purity analysis of sputter targets, refractory metals and many other minor metals. We are also a routine participant and organizer in international round-robin and interlaboratory studies for trace impurity analysis and reference material certification.

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Ranked by suitability:
1 - 1st choice
2 - alternative choice
3 - complementary
4 - case by case

		Elemental Analysis								Molecular Outgassing Analysis					Surface Textures			Thermal Analysis		
		EDS	ETV-ICP-OES	GDMS	ICP-MS	ICP-OES	IGA	LA-ICP-MS	LIBS	CHLD	DIP-MS	EGA	RGA	TGA-IR/MS	Gas Sorption	Profilometry	SEM	TGA	DSC	DTA
Composition & Purity Analysis	4N5 - 7N+ Purity Sputter Targets (Li - U, 0.0005 - 1000 µg/g)			1	2		3													
	High Purity Metals and Advanced Alloys (Li - U, 0.0005 - 1000 µg/g)			1	1	2	3	2												
	Advanced Ceramics and Glass (Li - U, 0.01 - 1000 µg/g)			1	2	2	3	1												
	Graphite, Carbon Fiber, Composites (Li - U, 0.001 - 1000 µg/g)		2	1	2		3													
	Si, SiC and Compound Semiconductors (Li - U, 0.0005 - 1000 µg/g)			1	2															
	Aqueous Liquids (Li - U, excluding halogen, 0.005 - 1000 µg/g)		4		1	2														
	Organics (Li - U, excluding halogen, 0.005 - 1000 µg/g)		2		1	2		2												
	Composition Analysis of Metal Alloys (Li - U, excluding halogen, %mass)					1		2									2			
	Composition Analysis of Ceramics and Glass (Li - U, excluding halogen, %mass)					1	2	3									2			
	Gas Forming Elements H, C, O, N and S (0.5 µg/g - %mass)						1						2							
	Fractional H, C and O Analysis (1 µg/g - %mass)						1													
Spatial Distribution	Depth Specific Measurement of 100s um Thick Coatings (Li - U, 0.01 µg/g - %mass)			1				3	2											
	Depth Specific Measurement of Thin Films (Li - U, 0.01 µg/g - %mass)			1					2								2			
	2D and 3D Element Distribution Mapping (Li - U, 0.5 µg/g - %mass)							1	1											
	Leaching and Extraction				1	2														
Compliance Testing	RoHS Compliance			2	1	1														
	Specification - Batch Quality Control / Comparison		4	4	4	4	4	4	4					4	4					
Outgassing Analysis	Gas Analysis & Leak Detection in Hermetic Package with DLA suitability									2			1							
	Evolved Gas Analysis under High Vacuum (up to 1200°C)						4				1	1								
	Evolved Gas Analysis in inert, moisture, oxidizing and reducing atm. (up to 1400°C)						4							1						
	Direct Gas Analysis											1	1							
Other Testing	Glass Transition, melting/incipient melting, and other phase transformation (-90 to 1500°C)																		1	2
	Thermal Decomposition / Thermal Stability / Accelerated Aging										4			4				1		
	Loss on Ignition / Loss on Drying (moisture contents)																	1		
	BET Surface Area / Pore Size Distribution														1	4	4			
	Surface Roughness															1				
Scientific Support	Materials - and/or process - related problem solving	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Litigation Support				4	4	4													
	Failure Analysis (surface contaminants, material ID, H embrittlement, corrosion)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Our complete list of instrumentation can be found at eag.com/techniques.