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Reduced-Cost, Ambient Desorption Optical Emission Spectroscopy for Performing Elemental Analysis (2016-018)

Reduces costs and increases portability of elemental analysis instruments

Market Overview

This analytical instrument uses ambient desorption optical emission spectroscopy (AD-OES) to perform elemental analysis on samples as diverse as metallic thin films, solution residues, powders, and bulk metals – directly from the solid state. Ambient desorption refers to the capability to analyze substances in their native state, and the ability to do AD-OES means cost efficient, simpler instrumentation can be used to do this in-field. The market for elemental analysis is expected to be worth $6.213 billion by 2020 and the global homeland security market is estimated to reach $544.02 billion by 2018. Clemson University researchers have developed an approach to using AD-OES for elemental analysis that does not require the use of a mass spectrometer (MS) for detection or a laser for vaporization, thereby reducing costs and increasing portability of the instrument. This approach is particularly useful in scenarios where analysts cannot or do not want to transport samples back to a laboratory and dissolve them for analysis.

Application

Homeland security; in-field elemental analysis

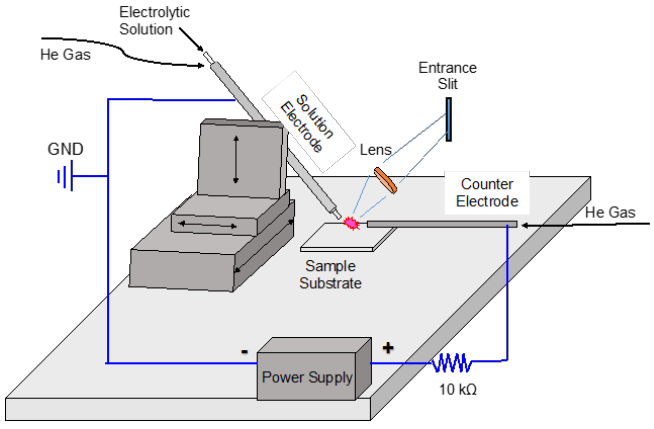
Stage of Development

Proof-of-concept

Advantages

- Utilizes OES sampling of the plasma, reducing costs and allowing easier portability
- Allows solid materials to be analyzed directly, eliminating the need for an acid dissolution step
- No sample preparation required to affect an elemental analysis

Technical Summary



Clemson University researchers have developed a new analytical instrument for performing elemental analysis of species on a solid substrate via OES. This approach applies the liquid sampling-atmospheric pressure glow discharge (LS-APGD) microplasma to desorb material from a solid surface, breaking it down to atomic form, and then exciting the atoms so they emit light corresponding to the elements present. The method allows for the elemental composition of the surface species (or those deposited on a surface, such as powders or residues) to be determined qualitatively and quantitatively and does not require sample preparation. LS-APGD can also perform elemental analysis of liquids, particles, and solid surfaces and introduce particles without modification. The ability to vaporize metal films, bulk metals, and solutions deposited on silica wafers has been demonstrated by the researchers. AD-OES would be much more attractive than MS in terms of instrumentation overhead and the ability to perform elemental analysis in the field and simple in-laboratory platforms.

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App Type	Country	Serial No.	Patent No.	CURF Ref. Number	Inventors
Provisional	United States	62/276,364	NA	2016-018	Richard Kenneth Marcus, Htoo Paing, Xinyan Zhang

About the Inventor

Dr. Marcus is a Professor of Analytical Chemistry in the Department of Chemistry at Clemson University. He earned his Ph.D. in analytical chemistry from the University of Virginia. Dr. Marcus was named a Fellow of the Royal Society of Chemistry (FRSC) in 2010, a Fellow of the American Association for the Advancement of Science (FAAAS) in 2012, and a Fellow of the Society for Applied Spectroscopy (FSAS) in 2016. He was also the recipient of the 2001 S.C. Governor's Award for Excellence in Science Research. His research interests focus on new plasma techniques for atomic spectroscopic analysis and liquid chromatography.

For More Information

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