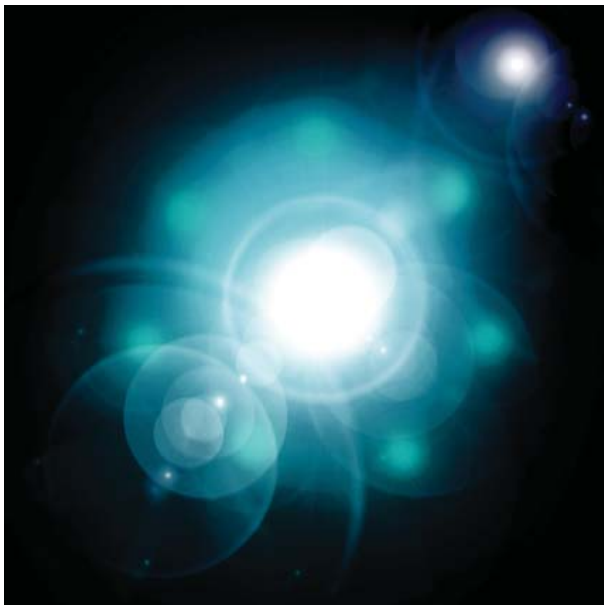
National Aeronautics and Space Administration

technology opportunity

Spectroscopic Chemical Analysis Methods and Apparatus

A Non-contact Spectroscopic Method and Apparatus for Performing Chemical Analysis



This instrument irradiates a sample with deep UV radiation, and then uses an improved filter for separating wavelengths to be detected.

This invention relates to non-contact spectroscopic methods and apparatus for performing chemical analysis and the ideal wavelengths and sources needed for this analysis. It employs deep ultraviolet (200- to 300-nm spectral range) electron-beam-pumped wide bandgap semiconductor lasers, incoherent wide bandgap semiconductor light-emitting devices, and hollow cathode metal ion lasers. Three achieved goals for this innovation are to reduce the size (under 20 L), reduce the weight [under 100 lb (≈45 kg)], and reduce the power consumption (under 100 W). This method can be used in microscope or macroscope to provide measurement of Raman and/or native fluorescence emission spectra either by point-by-point measurement, or by global imaging of emissions within specific ultraviolet spectral bands. In other embodiments, the method can be used in analytical instruments such as capillary electrophoresis, capillary electro-chromatography, high-performance liquid chromatography, flow cytometry, and related instruments for detection and identification of unknown analytes using a combination of native fluorescence and/or Raman spectroscopic methods.

Technology in Detail

This design provides an electron-beam-pumped semiconductor radiation-producing method, or source, that can emit at a wavelength (or wavelengths) below 300nm, e.g. in the deep ultraviolet between about 200 and 300 nm, and more preferably less than 260nm. In some variations, the method is to produce incoherent radiation, while in other implementations it produces laser radiation. In some variations, this object is achieved by using an AlGaN emission medium, while in other implementations a diamond emission medium may be used.

This instrument irradiates a sample with deep UV radiation, and then uses an improved filter for separating wavelengths to be detected. This provides a multi-stage analysis of the sample. To avoid the difficulties related to producing deep UV semiconductor sources, a pumping approach has been developed that uses ballistic electron beam injection directly into the active region of a wide bandgap semiconductor material.

Patents

This technology has been patented (U.S. Patent 7,525,653).

Licensing and Partnering Opportunities

This technology is part of NASA's Innovative Partnerships Program, which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to inquire about licensing possibilities for this technology for commercial applications.

For More Information

If you would like more information about this technology, please contact:

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