Yttrium Speciation in an Inductively Coupled Plasma Utilizing Acousto-Optic Tunable Filter Hyperspectral Imaging (AOTF-HSI)

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Abstract

The use of tunable filter hyperspectral imaging (AOTF-HSI) is compared to a monochromator system to allow for detection of Yttrium (Y) lines, Scandium (Sc) lines, and Ar lines. The AOTF system is compared to the monochromator for plasma chemistry and characterization applications. The addition of an acousto-optic tunable filter (AOTF) is utilized to allow for wavelength accessibility and precision for the study of the plasma. The differences in gas composition of 0% and 5% H serve as a test of the AOTF-HSI system's capability to detect Yttrium (Y) lines, Scandium (Sc) lines, and Ar lines. The results indicate that the AOTF-HSI system is capable of detecting Yttrium (Y) lines, Scandium (Sc) lines, and Ar lines with high precision and accuracy.

1. Acousto-Optic Tunable Filter

- High frequency tunable mirror is applied to an optically transparent medium
- Embodiments produce periodic variations in the medium
- Output can be made tunable through the medium
- Output is formed in the medium
- Output is distributed in the medium

2. Hyperspectral Imaging

- Methods of data acquisition include both in-channel imaging and off-channel imaging
- Imaging techniques can be used for many purposes, including spectroscopy
- Imaging and spectroscopy can be performed on the same system
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3. ICP-AOTF-HSI System

- Operation of the system
- Operation of the system
- Operation of the system
- Operation of the system

4. Wavelength / Frequency Calibration

- Calibration of line emission wavelengths
- Calibration of line emission wavelengths
- Calibration of line emission wavelengths
- Calibration of line emission wavelengths

5. Sr Atom and Ion Spectral Emission Lines

- Emission lines of Sr atom and ion spectral emission lines
- Emission lines of Sr atom and ion spectral emission lines
- Emission lines of Sr atom and ion spectral emission lines
- Emission lines of Sr atom and ion spectral emission lines

6. Sr Atom and Ion Emission Images

- Emission images of Sr atom and ion emission images
- Emission images of Sr atom and ion emission images
- Emission images of Sr atom and ion emission images
- Emission images of Sr atom and ion emission images

7. System Software

- Software for controlling the system
- Software for controlling the system
- Software for controlling the system
- Software for controlling the system

8. Yttrium Speciation Study

- Background
- Background
- Background
- Background

9. ICP-Monochromator System

- Operation of the system
- Operation of the system
- Operation of the system
- Operation of the system

10. Yttrium Emission Line Identification

- Emission lines
- Emission lines
- Emission lines
- Emission lines

11. Yttrium Atom and Ion Emission Lines

- Emission lines of Yttrium atom and ion emission lines
- Emission lines of Yttrium atom and ion emission lines
- Emission lines of Yttrium atom and ion emission lines
- Emission lines of Yttrium atom and ion emission lines

12. YO Emission Band Identification

- Emission bands
- Emission bands
- Emission bands
- Emission bands

13. Hydrogen Addition

- Background corrected images
- Background corrected images
- Background corrected images
- Background corrected images

14. RF Power Study

- RF power study
- RF power study
- RF power study
- RF power study

15. Conclusions / Future Work

- Conclusions
- Conclusions
- Conclusions
- Conclusions

A Special Thanks To
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