NASA SBIR/STTR Technologies

Differential Diode Laser Sensor for High-Purity Oxygen

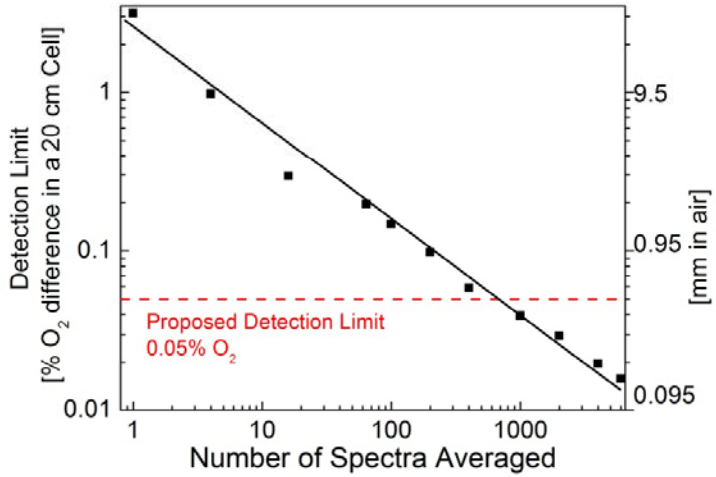
PI: Thomas Jenkins, Ph.D. - MetroLaser, Inc., Irvine, CA

Proposal No.: T6.02-9943

Identification and Significance of Innovation

A sensor concept was investigated for measuring oxygen purity with high accuracy in a compact rugged package that is adaptable to use in space use. An auto-balanced detector measures differential absorbance with respect to a pure oxygen reference cell, which is proportional to the difference in oxygen concentration. An accuracy of 0.05 percent absolute oxygen concentration was demonstrated in a 10-second measurement time.

Expected TRL Range at the End of Contract: 6



Technical Objectives and Phase II Work Plan

The Technical Objectives of Phase II: produce a working prototype oxygen purity sensor with 0.05 % accuracy, compact and rugged enough to enable the technology to be used in space missions.

The Work Plan includes the following tasks:

1. Kickoff Meeting
2. Lineshape Analysis
3. Optimize Measurement System Parameters
4. Optimize Sample Parameters
5. Design Prototype Instrument
6. Construct Prototype Instrument
7. Mechanical Testing of Components
8. Performance Testing of Prototype
9. Demonstrate in NASA Application
10. Analysis of Results
11. Commercialization Activities

NASA Applications:

Space-based verification of purity of oxygen produced on board the International Space Station (ISS). Extra vehicular activity (EVA) requires an oxygen purity of 99.5 percent or better.

Non-NASA Applications:

Verifying purity in oxygen boosting of glass, steel, and chemical manufacturing. Future versions of the sensor could find use in verifying purity of ammonia for use in selective catalytic reduction of NOx, or purity of hydrogen fluoride for use in semiconductor manufacturing.

Firm Contacts

Dr. Thomas Jenkins, PI – MetroLaser, Inc. (949) 553-0688 ext. 269
Dr. Cecil Hess, President – MetroLaser, Inc. (949) 553-0688
Ms. Christina Arnold, Director of Contracts – MetroLaser (949) 553-0688