

# NASA STTR Technologies

Non-Intrusive, On-line, Simultaneous Multi-Species Impurity Monitor in Hydrogen

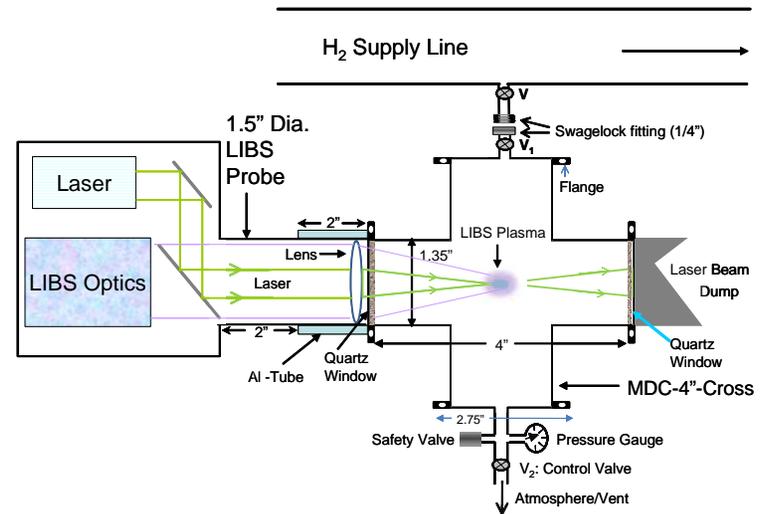
PI: Perry Norton, Mississippi Ethanol LLC, Winona, MS

Proposal No.: 07-T9.01-9990



## Identification and Significance of Innovation

In testing hydrogen-fueled rocket engines, the purity of the H<sub>2</sub> fuel is very important. Advanced sensors for monitoring the multi-species in H<sub>2</sub> fuel feed-line and in storage tank will be useful before the rocket engine testing and will also increase the understanding of the engine performance for improving SSC ground testing. We proposed to develop a sensitive, compact, sturdy, and user-friendly analytical instrument based on Laser Induced Breakdown Spectroscopy (LIBS) *to measure simultaneously the concentrations of nitrogen (N<sub>2</sub>), argon (Ar) and oxygen (O<sub>2</sub>) contaminants in hydrogen (H<sub>2</sub>) gas storage tanks and supply lines.*



*Schematic of the proposed sensor system.*

## Technical Objectives and Work Plan

- Design a H<sub>2</sub> sample cell and build gas sampling system
- Modify current LIBS system for measurement with hydrogen sample cell
- Design a LIBS system to collect simultaneous multi-impurity high resolution spectra in hydrogen
- Integrate LIBS system and sample cell
- Calibration system
- Software for data Collection, analysis and display
- Deliver a prototype to NASA/ SSC

## NASA and Non-NASA Applications

- Non- intrusive, simultaneous and multi-species impurity concentration in H<sub>2</sub> rocket engine fuel monitor
- Gas manufacturing and supplying industries
- A version of LIBS system can be developed to provide a useful monitor of toxic metal emissions from industrial facilities

## Contacts

Dr. Jagdish P. Singh ,Mississippi State University, 205 research Blvd ,Starkville, MS 39759  
Telephone: 662 325-7375