Development of a New Diode Laser Based Trace Gas Sensor


Laser Science Group

Outline

- Background
- Status of Current Sensor Technology
- Future Prospects
DEVELOPMENT OF A NEW DIODE LASER BASED TRACE GAS SENSOR

TECHNOLOGIES:

- SINGLE FREQUENCY DIODE LASER
- NONLINEAR OPTICAL MATERIAL
- ABSORPTION SPECTROSCOPY
- DATA ACQUISITION/ANALYSIS
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Scenario of Laser Diode Combinations and Accessible Trace Gas Species

Laser Diodes: SDL 6702-H1, P=50mW, 1083nm (quasi-fixed wavelength)
SDL-5412-H1, P=100mW, Tunable, Center Wavelength as indicated
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CO and H₂CO Prototype Sensor

H₂CO line @ 2861.7 cm⁻¹

Transmission

600 ppb

0.03 cm⁻¹

In collaboration with NASA Johnson Space Center
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Future Outlook
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Target Gas:
- Nitrous Oxide (N₂O)
- Sulfur Dioxide (SO₂)

Applications:
- Monitoring Environmentally Important Trace Gases
- Atmospheric Chemistry
- Volcanic Activities
- Paper Mills
DEVELOPMENT OF A NEW DIODE LASER BASED TRACE GAS SENSOR

Features:
- Compact
- High Sensitivity
- High Selectivity (Tunable)
- Fast Data Acquisition and Analysis
- Room Temperature
- Lightweight
- Robust
- Power Efficient
- No Consumables
- Cost Effective