RICE

Advanced Infrared Semiconductor Laser based Chemical Sensing Technologies

F.K. Tittel, Y. Bakhirkin, R.F. Curl, A.A. Kosterev, R. Lewicki, S. So and G. Wysocki

Rice Quantum Institute, Rice University, Houston, TX, USA
http://ece.rice.edu/lasersci/

- Motivation: Wide Range of Chemical Sensing
- Fundamentals of Laser Absorption Spectroscopy
- New laser sources and sensing technologies
- Selected Applications of Trace Gas Detection
  - Quartz Enhanced L-PAS (ammonia, Freon 125 and acetone)
  - Nitric Oxide Detection (Faraday Rotation & Remote Sensing)
- Future Directions and Conclusions

Work supported by NSF, NASA, DOE, and Robert Welch Foundation

Wide Range of Trace Gas Sensing Applications

- **Urban and Industrial Emission Measurements**
  - Industrial Plants
  - Combustion Sources and Processes (e.g. fire detection)
  - Automobile, Truck, Aircraft and Marine Emissions
- **Rural Emission Measurements**
  - Agriculture & Forestry, Livestock
- **Environmental Monitoring**
  - Atmospheric Chemistry
  - Volcanic Emissions
- **Chemical Analysis and Industrial Process Control**
  - Petrochemical, Semiconductor, Nuclear Safeguards, Pharmaceutical, Metals Processing, Food & Beverage Industries
- **Spacecraft and Planetary Surface Monitoring**
  - Crew Health Maintenance & Life Support
- **Applications in Health and Life Sciences**
- **Technologies for Law Enforcement and National Security**
- **Fundamental Science and Photochemistry**

RICE