



Los Alamos National Laboratory Request for Information Gas Sensors Technology Portfolio - Commercialization Opportunity

Los Alamos National Security, LLC (“LANS”) is the manager and operator of the Los Alamos National Laboratory (“LANL”) for the U.S. Department of Energy’s (“DOE’s”) National Nuclear Security Administration under contract DE-AC52-06NA25396. LANS is a mission-centric Federally Funded Research and Development Center focused on solving the most critical national security challenges through science and engineering for both government and private customers. LANS is currently seeking an industry partner(s) to assist with the commercial deployment of its novel Gas Sensors Technology Portfolio.

SOLID STATE GAS SENSORS

For nearly two decades, researchers at Los Alamos National Laboratory have been developing novel gas sensor technologies for a wide variety of applications, ranging from automotive and transportation to explosives detection. During this time, the LANS Gas Sensor Program has been funded by various sources, including: Cooperative Research and Development Agreements (CRADAs) with USCAR (the United States Council for Automotive Research) partners; DOE programs under Vehicle Technologies, Distributed Energy, and Fuel Cell Technologies program offices; Laboratory Directed Research and Development (“LDRD”); retained royalties; and technology maturation funds.



The development of gas sensors for highly specific applications is a very challenging task. The typical requirement to operate in harsh, post-combustion environments renders many conventional sensing technologies useless unless extractive systems and techniques are employed, often at unacceptable costs. Excessive cost and performance shortcomings are the two biggest impediments for use in vehicular applications. Moreover, even proven, in-situ sensing technologies cannot be used in some applications because of high levels of corrosive elements and compounds such as sulfur, heavy metals, particulates, etc. Scientists at LANL are actively pursuing new sensing technologies for these harsh environments that while seemingly diverse, are connected through common motivations tied to improved energy efficiency, reduced emissions, and protection of life, and the environment.

Unique features associated with the LANS Gas Sensor portfolio include the following:

- **Survivability** (wide range of operating environments from “clean” ambient air monitoring applications to exhaust gas or heavy boilers with sulfur, heavy metals, fly-ash, etc.).
- **Long operational lifetime** (e.g. projected 10+ years for sulfur tolerant oxygen sensors).

- **Excellent selectivity** (often the limiting factor for sensing technologies short of laboratory-based systems).
- **Exceptional reproducibility** (only one calibration curve required for each type of sensor).
- **Low cost** (technology based on existing, commercial manufacturing methods).

Los Alamos has a long, successful history of developing gas sensor technology for deployment in both commercial and government applications. The breadth of applications for the LANS Gas Sensor Portfolio is wide and includes, but is not limited to, the following areas:

- 1) Solid State Hydrogen Sensors for protection of infrastructure
- 2) NO_x Sensors for lean burn engine, and stationary reciprocating engine applications
- 3) Combustion Control Sensors for high sulfur environments
- 4) CO Sensors for air monitoring and in-flue appliance safety
- 5) Non-Methane Hydrocarbon Sensors for automotive OBD-II (On-Board Diagnostics) and air monitoring applications

In order to ensure broad commercial deployment of the LANS Gas Sensor Technology Portfolio, LANS is actively seeking one or more commercial partners to assist in the final phase of development and production of these important technologies. In particular, LANS is exploring multiple mechanisms for ensuring the vitality of its internal research and development program for government customers while accelerating the design, production, fabrication, packaging, and testing of these technologies for commercial deployment by partnering with at least one private entity.



The primary objective of this Call for Commercial Partners is to accelerate the timeline to transition these technologies from the laboratory environment into the commercial marketplace for broad deployment in a variety of application areas. The extensive technology development efforts undertaken by the Los Alamos Gas Sensor Team have resulted in a relatively high Technology Readiness Level (“TRL”) for the LANS technologies. Consequently, we are currently seeking one or more collaborative development partners and/or licensees to assist with our commercial deployment objectives.

POTENTIAL AREAS FOR PARTNERSHIP

The Los Alamos Team has identified several areas for potential partnership and/or commercial licensing to advance the LANS Gas Sensors portfolio:

- Automotive Emissions Monitoring and Emission Systems Control Sensors
- Combustion Control Sensors
- Power Plant Emissions Monitoring
- Off-road Diesel Engine Emissions Monitoring
- H₂ Safety Sensors (vehicle and infrastructure protection)
- CO Detectors
- Explosives Detection / Discrimination
- Remote Gas Sensing
- Methane and other Hydrocarbon Leak Detection

Please note that the foregoing table is non-exhaustive, and LANS is open to evaluating commercial interest in other application areas that have not been identified herein. To that end, LANS is opening this formal Request for Information to commercial entities in order to gauge the level of interest and potential for collaboration and/or licensing to achieve commercial deployment of the LANS Gas Sensors Portfolio. This offering is made without prejudice to any form of agreement, collaborative arrangement, alliance, number of entities, or partnering mechanism. ***Those companies interested in pursuing this commercialization opportunity should direct a Letter of Interest, as well as any comments or questions, to the undersigned on or before 11:59 PM MDT on Monday, December 8th, 2014.***

Below you will find the following: 1) a listing of the relevant LANS Intellectual Property; 2) details regarding the information that we are requesting in the form of a Letter of Interest; and 3) information regarding the next steps in the commercialization call process.

LANS GAS SENSOR PORTFOLIO OF INTELLECTUAL PROPERTY

1. **U.S. Patent # 5,543,025**, “Solid State Oxygen Sensor”, issued Aug 6, 1996 (DOE S-80,407).
2. **U.S. Patent # 5,695,624**, “Solid State Oxygen Sensor”, issued Dec 9, 1997 (DOE S-84,985).
3. **U.S. Patent # 6,656,336**, “Method for Forming a Potential Hydrocarbon Sensor with Low Sensitivity to Methane and CO, issued Dec 2, 2003 (DOE S-97,844).
4. **U.S. Patent # 6,605,202**, “Electrodes for Solid State Gas Sensor”, issued Aug 12, 2003 (DOE S-99,902).
5. **U.S. Patent # 7,214,333**, “Electrodes for Solid State Gas Sensor”, issued May 8, 2007 (DOE S-100,634).
6. **U.S. Patent # 7,264,700**, “Thin Film Mixed Potential Sensors”; issued Sept. 4, 2007 (DOE S-100,655)

Please note that the U.S. Government retains a worldwide, royalty-free, non-exclusive right to practice any LANS-owned patents and/or copyrighted software. Accordingly, any and all partners will have open access to any LANS patents and copyrights in performance of a Government contract.

Letter of Interest

LANS will select the most qualified collaboration partner(s) / licensee(s) through a competitive call for proposals—the Letter of Interest being the first step in that process.

Your Letter of Interest should include the following information:

- Description of your company and its mission;
- Explanation of the company’s interest in the technology and its relevance to the company’s goals and product offering(s);
- Demonstrated experience in developing and marketing a technology in one or more of these application areas;
- Brief description of the company’s financial and human resources available for commercializing this technology; and

- Any questions that you would like to have answered during a follow-on Webinar and/or Commercialization Workshop, should either one occur.

WHAT WE ARE REQUESTING

If you are interested in exploring this commercialization opportunity, please submit the required Letter of Interest on or before December 8th, 2014. Your Letter of Interest should include, at a minimum, the items listed above; however, you are welcome to include any additional information regarding your company (brochures, product information, etc.) that may help us to evaluate your interest and suitability as a commercialization partner. Depending upon the responses that we receive, LANS may host a follow-on Webinar and/or Commercialization Workshop to provide additional details regarding this commercialization opportunity. *Note: please properly mark any information that your company considers proprietary or business-sensitive. LANS will supply a Non-Disclosure Agreement (NDA) to companies that require such protection. NDAs with Non-U.S. companies will require additional time to process due to export control requirements.*

We look forward to reviewing your ideas on how together we can rapidly advance this technology towards the commercial marketplace and accelerate deployment to the benefit of the U.S. economy. Please respond by email to gassensors@lanl.gov, or call Laura Barber at (505) 667-9266 or Michael Erickson at (505) 667-8087. In order for your Letter of Interest to be considered responsive, it must be received by **COB on Monday, December 8th, 2014**. Letters may be sent to the contact listed below or submitted via email. We will contact you shortly after receipt of this information to provide additional information regarding the next steps in the commercialization partner selection process.

LANL Business Development Contacts – Richard P. Feynman Center for Innovation:

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