OPPORTUNITY
Research is active on optical sensors integrated with advanced sensing materials for high temperature embedded gas sensing applications. A portfolio of patented and patent pending technologies are available for licensing and/or further collaborative research from the U.S. Department of Energy’s National Energy Technology Laboratory (NETL). Organizations or individuals with capabilities in optical sensor packaging for harsh environment and high temperature applications are encouraged to contact NETL to explore potential collaborative opportunities.

OVERVIEW
Innovative process control systems for improved efficiency and lower emissions in current and future fossil fuel-based power systems and related applications requires the development of durable embedded sensor technology that can operate at higher temperatures and in harsh conditions. Currently available sensor technologies have limitations including functional temperature ranges, durability, and cost. There is a clear need for remote gas sensors that are capable of operating at temperatures approaching 1,000°C.

NETL has developed a portfolio of advanced optical sensor materials that address process monitoring in harsh environments and at temperatures approaching 1,000°C. These inventions integrate metal oxide-based functional sensor layers with optical waveguide-based platforms for gas composition analysis and other process variables. The novel materials and simplified fabrication processes are anticipated to provide for embedded sensors demonstrating long-term durability and functionality, processing, and industrial microwave processing.

SIGNIFICANCE
- A broad portfolio of technologies for high temperature optical gas sensing involving metal oxide-based nanoparticles and films.
- Nanocomposite materials demonstrating stability and durability in corrosive environments at temperatures approaching 900-1,000°C.
- Materials provide sensing responses across a broad range of wavelengths, which can potentially be used to construct multisensory arrays with enhanced sensing capabilities.
- Technologies allow for embedded optical sensors with remote monitoring capabilities.
- Novel materials that reduce fabrication complexity and cost of sensor devices.

Contact
NETL Technology Transfer
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(continued)
APPLICATIONS

- High temperature gas sensing for process monitoring and control in coal gasification, solid oxide fuel cells, gas turbines, boilers, and oxy-fuel combustion systems.
- Other areas where high temperature gas sensing is required, including nuclear power generation, aerospace, and industrial manufacturing process control.

RELATED PATENTS


