

TECHBRIEF

CORROSION DETECTION SENSORS FOR USE IN NATURAL GAS PIPELINES

OPPORTUNITY:

This invention describes a system and method for detecting corrosion in natural gas pipelines using an optical platform or a wireless platform. This technology is available for licensing and/or further collaborative research from the U.S. Department of Energy's National Energy Technology Laboratory.

CHALLENGE:

The U.S. Energy Information Administration states that natural gas accounts for nearly 30 percent of energy consumption in the United States. More than 300,000 miles of natural gas transmission and gathering lines deliver this valuable energy source to consumers. Like any energy infrastructure, this network of pipelines requires significant maintenance costs. In the case of natural gas pipelines, corrosion accounts for around 25 percent of incidents over the last 30 years, 61 percent of which was caused by internal corrosion.

The corrosion-related annual cost for such incidents amounts to \$6 to \$10 billion in the United States each year. Therefore, a need exists to monitor corrosion inside of the gas pipelines to implement corrosion mitigation and control before any failure.

OVERVIEW:

NETL researchers have developed a system to combat corrosion in natural gas pipelines through early detection using either optical or wireless sensing technology. A fiber-optic sensor network is capable of monitoring internal corrosion in the pipelines by realizing precise localized multi-parameter measurements of condensed water properties. Wireless sensors can also be used in this invention and provide low-cost, distributed point measurements. The wireless sensors can be placed at an arbitrary number of locations to best acquire information about the system being monitored.

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ADVANTAGES:

This novel sensor approach exhibits unparalleled advantages over existing corrosion and corrosion on-set detection approaches in high sensitivity, multi-parameter measurement, and remote and distributed sensing.

- Effectively assesses the structural health of a natural gas pipeline
- Enhances the safe operation of natural gas pipelines
- Helps to predict the corrosion rate and evaluate corrosion level
- Provides Top-of-the-Line Corrosion sensing information

APPLICATIONS:

Natural gas transmission and gathering lines

PATENT STATUS:

- U.S. Non-provisional Application No. 16/149,774
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Title: Distributed Fiber-Optic Sensor Network for Sensing the Corrosion Onset and Quantification

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