



Sensors

Real Time Oil Reservoir Evaluation Using Nanotechnology

Nanotechnology Sensors For Determination Of Chemical Substances In An Oil Reservoir

Scientists at NASA Ames Research Center have developed a system for evaluating status and response of a mineral producing field (e.g., oil and/or gas) by monitoring selected chemical and physical properties in or adjacent to a wellsite headspace using Nanotechnology sensors. The most advanced tool for monitoring the wells is a multiphase flow meter. It monitors the flow rate of oil, water, and gas. There is no tool or methodology that can provide the information about the quality of the oil such as hydrocarbon content and the oil-to-water ratio, which relate to the volume and production enhancement methods (i.e., steam injection). In large part, the future of the oil and gas industry depends on the ability to understand better the volume and dynamics of a reservoir to optimize production and avoid damaging the reservoir or interrupting flow through over-production or other production enhancement methods such as steam injection.

BENEFITS

- Improves the quality and production of the oil by monitoring the chemical composition in wells
- Allows data to be relayed back to decision makers for possible modification to production methods
- Increases oil production
- Has minimal impact on reservoirs

technology solution

NASA Technology Transfer Program

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THE TECHNOLOGY

The disclosed chemical nanosensor network, combined with the physical (micro)sensors such as humidity, temperature and pressure, acoustic or electromagnetic wave, form a monitoring system that substantially improves the quality and production of the oil by monitoring the chemical composition in wells and then relay the information to the decision maker to modify and fine tune the production enhancement methods in real time to improve the oil quality and control the quantity. Nanotechnology sensors and other sensors are provided for one or more underground (fluid) mineral-producing wellsites to determine presence or absence of each of two or more target molecules in the fluid, relative humidity, temperature and/or fluid pressure adjacent to the wellsite, and flow direction and flow velocity for the fluid. A nanosensor measures an electrical parameter value and estimates a corresponding environmental parameter value, such as water content or hydrocarbon content. The system is small enough to be located down-hole in each mineral-producing horizon for the wellsite.



The technology provides real-time Oil Reservoir Evaluation System using Nanotechnology

APPLICATIONS

The technology has several potential applications:

- Measuring hydro-carbon content in oil drilling
- Methane detection in mining industry
- Environmental monitoring
- Chemical and gas sensing
- Medical and food industry

PUBLICATIONS

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National Aeronautics and Space Administration

Technology Partnerships Office

Ames Research Center

MS 202A-3
Moffett Field, CA 94035
855-627-2249
ARC-TechTransfer@mail.nasa.gov

<http://technology.nasa.gov/>

www.nasa.gov

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