

SMART LowSal injection fluids for oilfield application to recover crude oil from the matured reservoir

IITM Technology Available for Licensing

Problem Statement

- Hydrocarbon resources (oil and gas) are vital for a country's energy supply and economic stability.
- These resources are extracted from onshore and offshore reservoirs using primary, secondary, and tertiary oil recovery methods, with the latter needed to recover residual oil from rock pores.
- Traditional enhanced oil recovery methods, such as thermal and chemical techniques, are expensive and have drawbacks.**
- The problem is to develop an economical SMART LowSal injection fluid that enhances oil recovery efficiency and **minimizes the risk of asphaltene and scale deposition in process pipelines.**

Intellectual Property

- IITM IDF Ref. 2230
- IN 404939 - Patent Granted

Technology Category/ Market

Category - Energy, Oil recovery

Applications - Crude oil recovery

Industry - Oil & gas, Petrochemical and Refining

Market - Global enhanced oil recovery market size is expected at \$54.12 Bn by 2027 at a growth rate of 7.9%

TRL (Technology Readiness Level)

TRL - 4: Technology validated in lab scale.

Research Lab

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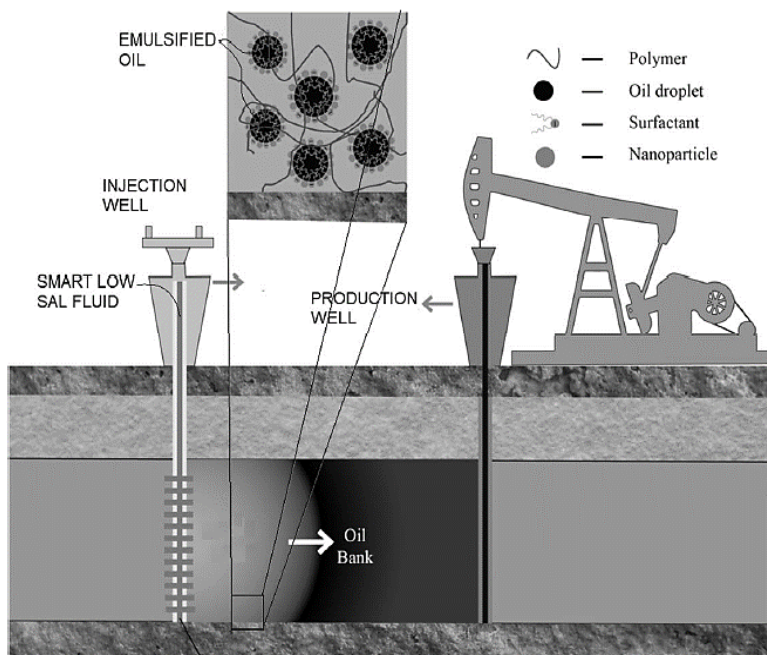


FIG. 1. Schematic of the crude oil production and interaction of the additives of the SMART LowSal with the oil molecules.

Technology

- The present invention proposes a **nanofluid composition for oil recovery from matured oil reservoir.**

The technology presents a nanofluid composed of a base fluid, a surfactant with specific alkali-surfactant ratios, a water-soluble polymer, and surface-modified or unmodified silica nanoparticles. This nanofluid is designed to enhance oil recovery in matured reservoirs with residual oil.

The nanofluid reduces interfacial tension (IFT) and alters the wettability of the rock-fluid system, making it more efficient in mobilizing oil.

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Technology Contd.

The technology leverages the phenomenon of spontaneous imbibition in low permeability reservoirs, where the nanofluid can be used as an efficient injection fluid for prolonged oil recovery.

Experimental results demonstrate that the nanofluid, particularly with 2000 ppm SiO₂ NPs, achieved a significant oil recovery of 55.38% through imbibition, making it a promising approach for enhanced oil recovery.

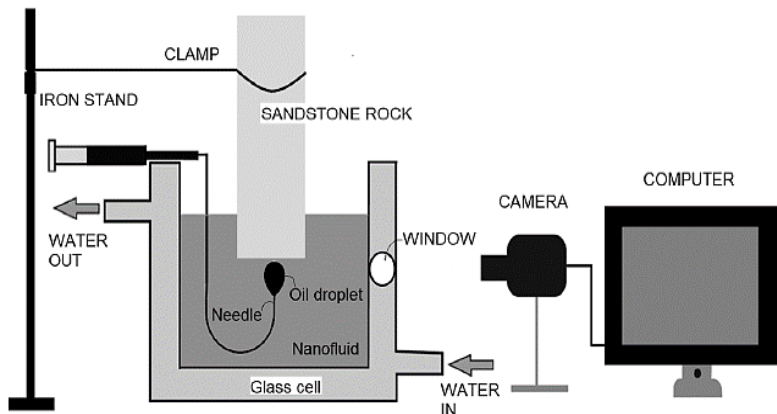


FIG. 2. Shows the schematic of the experimental setup used for contact angle measurement.

Key Features / Value Proposition

- The SMART LowSal injection fluid offers a highly effective solution for enhancing oil recovery in low permeability reservoirs through spontaneous imbibition.

Enhanced Reservoir Recovery

- The novel hybrid silica-based nanofluids reduce interfacial tension and enhance the wettability of rocks, allowing for increased oil mobility and recovery.

Improved Oil Mobility

- With its low salinity level, the technology minimizes the risk of scale and asphaltene deposition in pipelines, aligning with eco-friendly practices.

Low Salinity

- By leveraging spontaneous imbibition, this technology extends the lifespan of reservoirs and enables prolonged and efficient oil recovery.

Extended Reservoir Lifespan

- Advanced analysis techniques, such as X-ray computed tomography and scanning electron microscopy, provide valuable insights for informed reservoir management

Data-Driven Decision-Making

- The results demonstrate a remarkable 55.38% oil recovery using NF2000, indicating the technology's potential to significantly increase oil production in low permeability reservoirs.

Substantial Oil Recovery

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