PULSUS
Journal of
Materials Engineering and Applications
Abstract

# Innovative Design of Nanoparticles: Challenges and Opportunities for Oilfield Applications

**Ravi Shankar Kumar**

*Enhanced Oil Recovery Laboratory, Department of Petroleum Engineering and Geological Sciences, Rajiv Gandhi Institute of Petroleum Technology, India-229304*

**Abstract:**

The increased demand of hydrocarbon enforces reduction in oil reserves globally which became one of the major challenge for the world. Thusly, improving oil production from current reservoirs holds the key to meet the current and near future challenges of global energy demands. The development of new technologies such as nanotechnologies showed potential benefits to address energy challenges for several industrial applications including oilfield. Silica Nanofluid, a colloidal solution of solid charged silica (SiO2) nanoparticles (NPs) suspended in a base fluid (oil/water/glycol/polymeric solutions); possibly beneficial to improve the oil production by governing the matter of facts at nano scale level [1]. However, uniform distribution of NPs within the nanofluid (stable nanofluid) significantly improves the oil recovery due to large exposed surfaces [2]; remarkably able to modify reservoir rock/fluid properties such as wettability of reservoir rock/interfacial tension (IFT) between oil and nanofluid [3]. Therefore, the first requisite for nano-assisted oil recovery (N-EOR) is attributed to the stability of nanofluid and secondly, the impact of stable nanofluids on reservoir properties since flowing through porous media. However, stability of any nanofluid can be influenced by reservoir conditions such as high temperature, high salinity which may reduce oil production in N-EOR process [1,4].

In this regard, silica nanofluids were prepared using deionized (DI) water and found unsuccessful due to rapid agglomeration of NPs in results showed severe sedimentation. Thusly, a typical oilfield polymer polyacrylamide (PAM) were utilized as base fluid (1000 ppm PAM solution) to render the effect of NPs agglomerations [5]. PAM also provides suitable viscosity contrast to displace the oil in porous media through providing stable rheological properties [5]. However, harsh reservoir conditions such as temperature and salinity limits the applicability of nanofluid and makes them a conventional fluid. Thusly, another similar charged and thermally stable NPs (TiO2) were included in the silica nanofluid to curtail the effect of temperature for harsh reservoirs [5,6]. In the other hand, anionic surfactant were included to the silica nanofluid to render the effect of silica nanofluid in high saline reservoirs [4].

**Biography:**

Ravi Shankar Kumar is a PhD Scholar at Enhanced Oil Recovery (EOR) Laboratory (Department of Petroleum engineering and Geological Sciences)at Rajiv Gandhi Institute of Petroleum Technology, India (Institute of National Importance) under the Ministry of Petroleum &Natural Gas, Govt. of India. He is working under Dr.Tushar Sharma on Chemical based EOR techniques, Nanofluid Design, CO2 stabilized foam flooding, Carbon Capturing (Trapping), Rheology of polymer-based nano-fluids, CO2 trapping, Nano-assisted EOR, etc.

**Recent Publications:**

1. Ravi Shankar Kumar et al; Cooperative sustainable supply chain for deteriorating item and imperfect production under different carbon emission regulations, 2020.
2. Ravi Shankar Kumar et al; An EPQ model for deteriorating items with imperfect production, inspection errors, rework and shortages : a type-2 fuzzy approach, 2019.
3. Ravi Shankar Kumar et al; Modelling a type-2 fuzzy inventory system considering items with imperfect quality and shortage backlogging, 2018.
4. Ravi Shankar Kumar et al; Trade-credit modeling for deteriorating item inventory system with preservation technology under random planning horizon, 2018.
5. Ravi Shankar Kumar et al; Vendor-buyer integrated production-inventory system for imperfect quality item under trade credit finance and variable setup cost, 2018.

**Frontiers in Nanotechnology and Nanomaterials; May 04-05, 2020; Vienna, Austria**

**Citation:** Ravi Shankar Kumar; Innovative Design of Nanoparticles: Challenges and Opportunities for Oilfield Applications; Nanotechnology 2020; May 04-05, 2020; Vienna, Austria.