Advances in chemical enhanced oil recovery using nanofluids

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Short Biography

Usama is an Associate Professor and Head of department of Chemical and Petrochemicals Engineering (CPE) at the Egypt Japan University of Science and Technology (EJUST). He holds a BSc in Chemical Engineering from Faculty of Engineering at Minia University, Egypt, MSc in Chemical Engineering, and PhD in Chemical Engineering from the same university. His specific research interests are in enhanced oil recovery (EOR), natural gas processing and liquefaction, carbon dioxide capture, storage and sequestration. He also has a research interest in computer aided modelling, optimization and simulation with applications to performance, energy and environment in chemical processes. He has supervised over 50 graduate students (of which 9 are PhDs) in these fields and his graduate students all obtain good jobs in the chemical process industry and in academia. He has been funded for several research projects from government and industry in Egypt & Malaysia. Among his accomplishments are the Outstanding Faculty Award (in the last ten years), the effective teaching award from Petronas University, Malaysia and outstanding industrial training award from INSTEP, Petronas, Malaysia. He has more than 45 journal articles, 50 proceedings, and has been an invited speaker on numerous occasions at academic institutions throughout the world and at national and international conferences. He is also an active reviewer to the journal of energy and gas science and engineering at Elsevier since 2011, he reviewed more than 267 papers. He acted as a committee member for education and accreditation at society of petroleum engineering (SPE) from 2015 to 2018. He is a member of American chemical society (ACS) since 2012 and now he is a Community Associate at ACS.

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Abstract

Enhanced oil recovery (EOR) is a technique used to extract more oil from a reservoir than conventional methods. The goal of EOR is to improve oil recovery by injecting fluids into the reservoir to increase the pressure and reduce the viscosity of the oil, making it easier to extract. This paper discusses the potential of nanofluids in enhanced oil recovery (EOR) applications. The unique properties of nanofluids make them attractive for EOR. This paper provides an overview of the different types of nanoparticles that can be used in nanofluids for EOR, including metal oxide. Zinc oxide (ZnO), nickel oxide (NiO) nanoparticles were successfully synthesized via sol-gel method. The particles' morphology and the size of their distribution were examined using TEM, FTIR, XRD, and Zeta Potential to determine the effect of synthesis processes and condition used. The mechanisms by which nanoparticles improve EOR, such as reducing the interfacial tension between oil and water, are also discussed. The paper demonstrates recent research on the use of nanofluids for EOR and highlights the challenges associated with their implementation. The paper concludes that nanofluids have the potential to significantly improve oil recovery rates and extend the life of oil fields, but further research is needed to fully understand their potential and to address the challenges associated with their use.