

Enhanced oil recovery with nanoparticles

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A mixture of nanoparticles and water can be used in the nano-water alternating gas approach (NWAG) to enhance oil recovery from an oil field. Now, the wettability of rock, relative permeability curves, and the interfacial tension has been analysed by a team from Oman with a view to improving the process.

Manal Al-Matroushi, Peyman Pourafshary, and Yahya Al-Wahaibi of

the Petroleum and Chemical Engineering Department at Sultan Qaboos University and Nader Mosavat of the Oil and Gas Research Centre there explain that the gradual depletion of oil reserves has led to worldwide attention on how we might improve current enhanced [oil recovery](#) techniques. Changing the wettability of carbonate rock, which is less permeable, fractured, and oil-wet, is one way forward. Indeed, steam, gas, or chemicals can be injected to alter the fluid-fluid and rock-fluid structures by modifying [interfacial tension](#), wettability, the mobility ratio and permeability and so allow more oil to be recovered. In a more exacting approach, water and gas are injected alternately to improve efficiency.

The addition of water-repellant silica nanoparticles to the formulation leads to their forming a coating on the rock and this improves [wettability](#). The team has now shown that using "nano-water" instead of water alone in the wetting cycle of the process enhances oil recovery. Indeed, they found that in a six-month-long cycle with five months of nano-water and one-month carbon dioxide gas injection that oil recovery rose by 13% compared to conventional alternative water and gas enhancement.

More information: Manal Al Matroushi et al. Efficiency of nano-water/gas alternating injection technique to enhance oil recovery in an oil field, *International Journal of Oil, Gas and Coal Technology* (2018). [DOI: 10.1504/IJOGCT.2018.094539](https://doi.org/10.1504/IJOGCT.2018.094539)

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