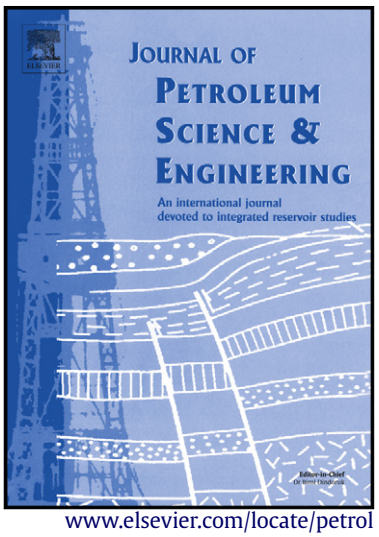


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PII: S0920-4105(15)00102-3
DOI: http://dx.doi.org/10.1016/j.petrol.2015.03.003
Reference: PETROL2984

To appear in: *Journal of Petroleum Science and Engineering*

Received date: 9 December 2014
Accepted date: 3 March 2015

Cite this article as: Hui Mao, Zhengsong Qiu, Zhonghou Shen, Weian Huang, Hydrophobic Associated Polymer Based Silica Nanoparticles Composite with Core-shell Structure as a Filtrate Reducer for Drilling Fluid at Utra-high Temperature, *Journal of Petroleum Science and Engineering,* http://dx.doi.org/10.1016/j.petrol.2015.03.003

# Hydrophobic Associated Polymer Based Silica Nanoparticles Composite with Core-shell Structure as a Filtrate Reducer for Drilling Fluid at Utra-high Temperature

Hui Mao*[1], Zhengsong Qiu, Zhonghou Shen, Weian Huang

*School of Petroleum Engineering, China University of Petroleum (East China), Qingdao Shandong, 266580, China;*

**ABSTRACT**

Nano or micro-nano based materials have attracted a strong interest due to its attractive properties and they have great potential for developing intelligent drilling fluid in petroleum industry. In this article, a novel hydrophobic associated polymer based silica nanoparticles composite with core-shell structure which was mainly used for developing intelligent drilling fluid additive for drilling ultra-deep well under ultra-high temperature, ultra-high pressure and salinity, was prepared with Acrylamide, 2-Acrylamide-2-methylpro pane sulfonic acid, Maleic anhydride, Styrene and silica nanoparticles via inverse micro emulsion polymerization and sol-gel preparation, and was characterized by particle size distribution, SEM, TEM ESEM and the influence law of comprehensive performance of water based drilling fluid and its mechanism influenced by novel hydrophobic associated polymer based silica nanoparticles composite were studied too. Micro-model drilling fluid flooding and drilling fluid displacement experiment of core column were adopted to assess the plugging stability of micro-pores and micro-cracks and effect on wellbore stability. The experimental data showed that, the composite as a micro-nano drilling fluid additive, possessed excellent properties such as thermal stability, rheology, fluid loss and lubricity. Especially, it could plug the formation effectively and improve the pressure bearing capability of formation significantly.

**KEYWORDS:** Polymers; Drilling fluids; Composite materials; Microstructure; Thermal properties; Ultra-high temperature



## 1. Introduction

As we all know that drilling fluid in the drilling process of oil and gas well drilling engineering can be seen as the equivalent to the blood in the human body [1]. Drilling fluid is a typical coarse dispersion colloidal suspension

* Corresponding author at: College of Petroleum Engineering, China University of Petroleum (East China), Qingdao Shadong, 266580, China; Tel:+86 18561917201. E-mail addresses: maohui01@163.com.