

## Research on Low interfacial Tension Viscoelastic Fluid Oil Displacement System in Unconventional Reservoir

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**Abstract :** Unconventional oil reservoirs have the characteristics of strong heterogeneity and poor injectability, and traditional chemical flooding technology is not effective in such reservoirs; polymer flooding in the production of heavy oil reservoirs is difficult to handle produced fluid and easy to block oil wells, etc. Therefore, a viscoelastic fluid flooding system with good adaptability, low interfacial tension, plugging, and diverting capabilities was studied. The viscosity, viscoelasticity, surface/interfacial activity, wettability, emulsification, and oil displacement performance of the anionic Gemini surfactant flooding system were studied, and the adaptability of the system to the reservoir environment was evaluated. The oil displacement effect of the system in low-permeability and high-permeability (heavy oil) reservoirs was investigated, and the mechanism of the system to enhance water flooding recovery was discussed. The results show that the system has temperature resistance and viscosity increasing performance (65°C, 4.12mPa•s), shear resistance and viscoelasticity; at a lower concentration (0.5%), the oil-water interfacial tension can be reduced to ultra-low (10-3mN/m); has good emulsifying ability for heavy oil, and is easy to break demulsification (4.5min); has good adaptability to reservoirs with high salinity (30000mg/L). Oil flooding experiments show that this system can increase the water flooding recovery rate of low-permeability homogeneous and heterogeneous cores by 13% and 15%, respectively, and can increase the water-flooding recovery rate of high-permeability heavy oil reservoirs by 40%. The anionic Gemini surfactant flooding system studied in this paper is a viscoelastic fluid, has good emulsifying and oil washing ability, can effectively improve sweep efficiency, reduce injection pressure, and has broad application in unconventional reservoirs to enhance oil recovery prospect.

**Keywords :** oil displacement system, recovery factor, rheology, interfacial activity, environmental adaptability

**Conference Title :** ICIAC 2022 : International Conference on Industrial and Applied Chemistry

**Conference Location :** Tokyo, Japan

**Conference Dates :** February 24-25, 2022