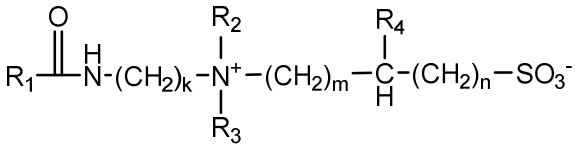
CLAIMS

1. A viscoelastic fluid for a subterranean formation comprising:

viscoelastic surfactant according to formula (I):



where R_1 is a saturated or unsaturated hydrocarbon group of from 17 to 29 carbon atoms, R_2 and R_3 are each independently selected from a straight chain or branched alkyl or hydroxyalkyl group of from 1 to 6 carbon atoms, R_4 is selected from H, hydroxyl, alkyl or hydroxyalkyl groups of from 1 to 4 carbon atoms; k is an integer of from 2-20; m is an integer of from 1-20; and n is an integer of from 0-20;

brine solution; and

at least one polyacrylamide viscosity modifier with a weight averaged molecular weight (Mw) from 250,000 g/mol to 40,000,000 g/mol.

2. The viscoelastic fluid for a subterranean formation according to claim 1, where the viscoelastic surfactant comprises erucamidopropyl hydroxypropylsultaine.

3. The viscoelastic fluid for a subterranean formation according to claim 1, further comprising solvent, preferably where the solvent is selected from water, alcohol, or combinations thereof and more preferably where the alcohol comprises monohydric alkyloxy, diol, triol, or a combination thereof.

4. The viscoelastic fluid for a subterranean formation according to claim 1, in which the viscoelastic fluid comprises 0.5% to 20% by volume, or 2% to 8% by volume, or 3% to 6% by volume of viscoelastic surfactant.

5. The viscoelastic fluid for a subterranean formation according to claim 1, in which the viscoelastic fluid comprises about 80% to 99% by weight of brine solution, preferably where the brine solution comprises 1% to 50% by weight, or 10% to 40% by weight, or 15% to 35% by weight of one or more metal salts.

6. The viscoelastic fluid for a subterranean formation according to claim 1, in which the brine solution comprises one or more metal halides, preferably in which the metal halides comprise calcium chloride, calcium bromide, zinc bromide, or combinations thereof.

7. The viscoelastic fluid for a subterranean formation according to claim 1, in which the polyacrylamide comprises nonionic polyacrylamides, acrylamide copolymers, polyacrylamide-based terpolymers, polyacrylamide-based tetra-polymers, modified polyacrylamides, or combinations thereof.

8. The viscoelastic fluid for a subterranean formation according to claim 1, in which the polyacrylamide viscosity modifier has an Mw from 2,000,000 g/mol to 8,000,000 g/mol.

9. The viscoelastic fluid for a subterranean formation according to claim 1, in which the nonionic polyacrylamide viscosity modifier has a hydrolysis level of less than 5 mol% or 1 mol%.

10. The viscoelastic fluid for a subterranean formation according to claim 1 further comprising at least one additional additive, preferably wherein the additional additive comprises polyelectrolytes, such as polycations and polyanions, or zwitterionic polymers, such as zwitterionic polyacrylamides and copolymers.

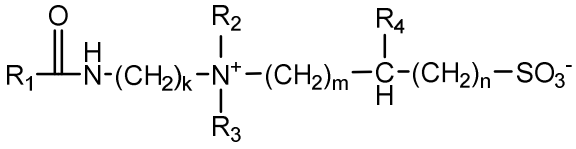
11. The viscoelastic fluid for a subterranean formation according to claim 1 further comprising breaker material.

12. The viscoelastic fluid for a subterranean formation according to claim 1, further comprising at least one additional surfactant.

13. The viscoelastic fluid for a subterranean formation according to claim 12, in which the additional surfactant comprises cationic surfactant, anionic surfactant, non-ion surfactant, zwitterionic surfactant or a combination thereof.

14. A method of treating a subterranean formation penetrated by a wellbore with a viscoelastic fluid comprising:

mixing a viscoelastic surfactant according to formula (I), a polyacrylamide viscosity modifier, and a brine solution to produce the viscoelastic fluid, the viscoelastic surfactant according to formula (I):



(I)

where R_1 is a saturated or unsaturated hydrocarbon group of from 17 to 29 carbon atoms, R_2 and R_3 are each independently selected from a straight chain or branched alkyl or hydroxyalkyl group of from 1 to 6 carbon atoms, R_4 is selected from H, hydroxyl, alkyl or hydroxyalkyl groups of from 1 to 4 carbon atoms; k is an integer of from 2-20; m is an integer of from 1-20; and n is an integer of from 0-20;

in which the polyacrylamide viscosity modifier has a hydrolysis level of less than 5 mol% and a weight averaged molecular weight (Mw) from 250,000 g/mol to 40,000,000 g/mol; and

introducing the viscoelastic fluid into the subterranean formation through the wellbore, in which the treatment fluid is subjected to temperatures greater than 121.1°C (250°F).

15. The method of treating a subterranean formation penetrated by a wellbore with a viscoelastic fluid according to claim 14, where the treatment fluid is subjected to temperatures greater than 135°C (275°F).