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(54) **POLYELECTROLYTE COMPLEXES FOR OIL AND GAS APPLICATIONS**

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(57) **ABSTRACT**

A polyelectrolyte complex for the controlled release of an oil and gas field chemical selected from the group consisting of (a) a gel-forming or cross-linking agent, (b) a scale inhibitor, (c) a corrosion inhibitor, (d) an inhibitor of asphaltene or wax deposition, (e) a hydrogen sulfide scavenger, (f) a hydrate inhibitor, (g) a breaking agent, and a surfactant.

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Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

Dear Sir:

In response to the final Office Action dated January 18, 2011, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 7 of this paper.

A **Request for Continued Examination** is also attached with a check to cover the required fee.

Certificate of Mailing Under 37 C.F.R. 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Mail Stop RCE, Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on:

Date: March 22, 2011
Signature: Mary E. Menard
Printed Name: Mary E. Menard

The Director is hereby authorized to charge any additional amount required, or credit any overpayment, to Deposit Account No. 19-4409.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

What is claimed and desired to be secured by Letters Patent is as follows:

1. (currently amended) A method for controlling or delaying the release of an oil and gas field chemical comprising:

providing a polyelectrolyte complex comprising a polyanion and a polycation, said polyelectrolyte complex having a polymeric core and polymeric shell, said polyelectrolyte complex associated with said oil and gas field chemical; and wherein said polyelectrolyte complex is a nanoparticle having a particle size less than about ~~500~~ 5000 nm;

wherein said oil and gas field chemical is selected from the group consisting of (a) a gel-forming or cross-linking agent selected from the group consisting of complexed zirconium compound, a complexed titanium compound, a complexed chromium compound, a complexed aluminum compound, a complexed tin compound, a complexed iron compound, formaldehyde; precursors of formaldehyde, furfuryl alcohol, aminobenzoic acid, phenol and phenolic derivatives; (b) a scale inhibitor which is not EDTA; (c) a corrosion inhibitor; (d) an inhibitor of asphaltene or wax deposition; (e) a hydrogen sulfide scavenger; (f) a hydrate inhibitor; and (g) a surfactant; and

introducing said polyelectrolyte complex associated with said oil and gas field chemical into an oil and gas well.

2. (canceled)

3. (original) The method of Claim 1 wherein said polycation is selected from the group consisting of chitosan, polyethylenimine, poly-L-lysine and said polyanion comprises dextran sulfate.
4. (original) The method of Claim 1 wherein said oil and gas field chemical is a gel-forming agent, and wherein said gel-forming agent is a complexed chromium compound selected from the group consisting of chromium nitrate, chromium chloride, chromium citrate, chromium acetate, chromium propionate.
5. (original) The method of Claim 1 further comprising a monovalent or bivalent cation selected from the group consisting of sodium ion or calcium ion.
6. (original) The method of Claim 1 further comprising an anion selected from the group consisting of triphosphate ion, chloride ion, or sulfate ion.
7. (canceled)
8. (original) The method of Claim 1 wherein said oil and gas field chemical is a scale inhibitor comprising polyacrylic acid.
9. (original) The method of Claim 1 wherein said oil and gas field chemical is a corrosion inhibitor comprising benzyldimethyltetradecylammonium chloride.
10. (original) The method of Claim 1 wherein said oil and gas field chemical is a surfactant comprising sodium dodecyl sulfate.
11. (previously presented) The method of Claim 1 wherein said polyelectrolyte complex is a nanoparticle with a particle size of about 100 to 300 nm in diameter.
12. (original) The method of Claim 1 wherein said providing step comprises
mixing said polyanion, said polycation, and said oil and gas field chemical together in solution;

ceasing mixing to form said polyelectrolyte complex comprising said polyanion and said polycation and said oil and gas field chemical associated with said polyelectrolyte complex.

13. (original) The method of Claim 12 wherein said polyanion and polycation are first mixed together separately prior to mixing said polyanion, polycation, and oil and gas field chemical.

14. (original) The method of Claim 12 wherein said polycation and oil and gas field chemical are first mixed together separately prior to mixing said polyanion, polycation, and oil and gas field chemical.

15. (original) The method of Claim 12 wherein said polyanion and oil and gas field chemical are first mixed together separately prior to mixing said polyanion, polycation, and oil and gas field chemical.

16. (original) The method of Claim 12 further comprising dialyzing said polyelectrolyte complex solution to isolate a polyelectrolyte nanoparticle having said oil and gas field chemical associated therewith.

17. (original) The method of Claim 12 wherein said oil and gas field chemical comprises a multivalent metallic cross-linking compound or organic cross-linking agent.

18. (original) The method of Claim 12 wherein said oil and gas field chemical is a cross-linking agent comprising a chromium containing compound.

19. (previously presented) The method of Claim 1 wherein said oil and gas field chemical is a gel-forming or cross-linking agent.

20. (currently amended) The method of Claim 1 wherein said oil and gas field chemical is a scale inhibitor which is not EDTA.

21. (previously presented) The method of Claim 1 wherein said oil and gas field chemical is a corrosion inhibitor.

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