CLAIMS

What is claimed is:

1. A reversing flow apparatus comprising a chamber having a series of two or more sequential rings mounted on a shaft extending axially through the chamber, the rings being separated by a space, each ring comprising a circumference and one or more S-shaped members extending from a point In the circumference to another point in the circumference and across a center of the ring, the two or more sequential rings being mounted along the shaft in a twist arrangement such that at least one ring in the apparatus has its S-shaped member in a forward-facing position and at least one ring in the apparatus has its S-shaped member in a reverse-facing position.

2. The reversing flow apparatus of claim 1, wherein the spiral apparatus includes a housing having an inflow portion for receiving one or more untreated liquids, a treatment portion containing the chamber for treating the one or more untreated liquid, and an outflow portion for releasing the treated one or more liquids.

3. The reversing flow apparatus according to any of claims 1 and 2, wherein the one or more rings are made of a metal or a combination of metals.

4. The reversing flow apparatus of claim 3, wherein the rings are made of stainless-steel containing molybdenum (Mo).

5. The reversing flow apparatus according to any one of claims 1-4, wherein the rings are made of a metal alloy comprising about 0.5 wt, % or more molybdenum, about 1 .0 wt. % or more molybdenum, about 1 .5 wt. % or more molybdenum or from about 3.0 wt. % to about 4.0 wt. % molybdenum.

6. A system for treating liquid solutions or emulsion, the system including a source of the liquid solution or emulsion and a reversing flow apparatus according to any of claims 1 to 5, the inflow portion of the reversing flow apparatus being operatively connected to the source.

7. The system of claim 6, wherein the system further comprises at least one of a filtration device, a UV sterilizer and a Z potential crystal generator, wherein the reversing flow apparatus, the source and the at least one of the filtration device, the UV sterilizer and the Z potential crystal generator are in liquid communication with one another.

8. The system of claim 6, wherein the system further comprises a filtration device, a UV sterilizer and a Z potential crystal generator, wherein the reversing flow apparatus, the

source, the filtration device, the UV sterilizer and the Z potential crystal generator are in liquid communication with one another.

9. The system according to any one of claims 6-8, wherein the system comprises multiple reversing flow apparatuses according to any one of claims 1 to 5.

10. A method producing a mixed solution of liquids or of one or more liquids with one or more solids, the method comprising passing the liquids to be mixed or the one or more liquids and the one or more solids to be mixed through the reversing flow apparatus according to any one of claims 1 to 5, thereby producing the mixed solution.

11. The method of claim 10, wherein the one or more liquids includes a gas.

12. The method of claim 10, wherein the one or more liquids are optionally passed, before or after the reversing flow apparatus, through at least one filtration system.

13. The method of 11, wherein the gas include nitrogen, oxygen, carbon dioxide, ozone, ethanol, methanol, hydrogen or combinations thereof.

14. A method of converting laminar flow to turbulent flow, the method comprising passing a liquid with laminar flow through the reversing flow apparatus according to any one of claims 1 to 5.

15. A liquid or emulsion processed with the reversing flow apparatus according to any one of claims 1 to 5.

16. A method of breaking an oil-in-water emulsion, the method comprising passing the oil-in-water emulsion though the reversing flow apparatus according to any one of claims 1 to 5 to obtain a processed material whereby a separate aqueous phase and oil phase is produced.

17. The method of claim 16, wherein the method further comprises pyrolyzlng the oil-in-water emulsion to obtain a derivative, and wherein the method comprises passing the derivative through the reversing flow apparatus according to any one of claims 1 to 5 instead of the oil-in-water emulsion.

18. The method of breaking the oil-in-water emulsion of claim 16 or claim 17, wherein the oil-in-water emulsion is oily wastewater, a petroleum feedstock or a part of a secondary oil recovery system.

19. A method of lowering the viscosity of liquid solution or emulsion containing oil, the method comprising passing the liquid solution or emulsion containing oil through the reversing flow apparatus according to any one of claims 1 to 5 to obtain a processed

material having lower viscosity than the liquid solution or emulsion containing oil, thereby lowering the viscosity of the liquid solution or emulsion containing oil.

20. A method of lowering the boiling point of an original liquid source having kerogens, long-chain hydrocarbons or a mixture thereof, the method comprising passing the original liquid source through the reversing flow apparatus according to any one of claims 1 to 5 to obtain a treated material, wherein the boiling point of the original liquid source is higher than the boiling point of the treated liquid.

21. A method of cracking a liquid comprising passing the liquid through the reversing flow apparatus of any one of claims 1 to 5 to obtain a cracked liquid.

22. The method of cracking a liquid of claim 18, wherein the cracked liquid contains contain more hydrocarbons having shorter carbon chain species relative to the liquid.

23. The method of cracking a liquid of claim 21 or claim 22, wherein the method is devoid of solvents.

24. The method of cracking a liquid of any one of claims 21-23, wherein the liquid is an emulsion, a petroleum feedstock or a part of a secondary oil recovery system.

25. ~~A method of treating~~Use of a liquid processed through the reversing flow apparatus of any one of claims 1 to 5 in the manufacture of a medicament for the treatment of Crohn's Disease, a neuropathy or reducing inflammation of knee joints in a subject~~, comprising administering to the subject a liquid processed through the reversing flow apparatus according to any one of claims 1 to 5~~.

~~26. A use of liquid processed through the reversing flow apparatus of any one of claims 1 to 5 to treat Crohn's Disease, a neuropathy or reduce inflammation of joints.~~