~~Amended~~ Claims

1. An ionic reactor comprising:

one or more cells, each cell comprising a pair of electrodes, at least one of the pair of electrodes having a metal;

a water stream comprising a plurality of positively charged ions and a plurality of negatively charged ions, the water stream flowing through the one or more cells; and

a voltage applied to the pair of electrodes to generate an electric field through the water stream,

wherein one or more ions of the metal are substituted by one or more of the positively charged ions of the water stream.

2. The ionic reactor of claim 1, wherein one or more of the plurality of negatively charged ions are reacted with the one or more positively charged ions of the metal to form an ionic compound.

3. The ionic reactor of claim 2, wherein one or more of any remaining plurality of positively charged particles are reacted with another one or more of the plurality of negatively charged particles to form another ionic compound.

4. The ionic reactor of claim 3, further comprising a separator configured to separate the ionic compound and any of the another ionic compound from the water stream.

5. The ionic reactor of claim 1, wherein the voltage is an alternating voltage.

6. The ionic reactor of claim 1, wherein the voltage is defined by a waveform and the waveform is any one of a sinusoidal wave, a square wave, a trapezoidal wave, and any combination thereof.

7. The ionic reactor of claim 1, wherein the metal is any one of magnesium, aluminum, and any combination thereof.

8. The ionic reactor of claim 1, additionally comprising an ultrasonic transmitter to prevent the buildup of a sediment layer along the pair of electrodes.

9. A method for treatment of water comprising:

providing a water stream having a plurality of positively charged ions and negatively charged ions;

flowing the water stream between a first electrode and a second electrode, at least one of the first electrode and the second electrode comprising a metal;

generating an electric field across the water stream by applying a voltage across the first electrode and the second electrode; and

substituting one or more ions of the metal with one or more of the plurality of positively charged ions of the water stream.

10. The method of claim 9, additionally comprising reacting one or more of the plurality of negatively charged ions with the one or more positively charged ions of the metal to form an ionic compound.

11. The method of claim 10, additionally comprising reacting one or more of any remaining plurality of positively charged ions with another one or more of the plurality of negatively charged ions to form another ionic compound.

12. The method of claim 11, additionally comprising removing the ionic compound and any of the another ionic compound from the water stream.

13. The method of claim 9, wherein the voltage is an alternating voltage.

14. The method of claim 9, wherein the voltage is defined by a waveform and the waveform is any one of a sinusoidal wave, a square wave, a trapezoidal wave, and any combination thereof.

15. The method of claim 9, wherein the metal is any one of magnesium, aluminum, and any combination thereof.

16. A system for the treatment of water comprising a reactor having:

one or more cells, each cell comprising a pair of electrodes, at least one of the pair of electrodes having a metal;

a water stream comprising a plurality of positively charged ions and a plurality of negatively charged ions, the water stream flowing through the one or more cells;

and a voltage applied to the pair of electrodes to generate an electric field through the water stream,

wherein one or more ions of the metal are substituted by one or more of the plurality of positively charged ions of the water stream.

17. The system of claim 16, wherein one or more of the plurality of negatively charged ions are reacted with the one or more positively charged ions of the metal to form an ionic compound.

18. The system of claim 17, wherein one or more of any remaining plurality of positively charged particles are reacted with another one or more of the plurality of negatively charged particles to form another ionic compound.

19. The system of claim 18, further comprising a separator configured to separate the ionic compound and any of the another ionic compound from the water stream.

20. The system of claims 16, wherein the metal is any one of magnesium, aluminum, and any combination thereof.