CLAIMS

1. A system for treating water comprising:

an electrochemical cell having an inlet and an outlet, the inlet of the electrochemical cell fluidly connectable to a source of water comprising at least one contaminant, the electrochemical cell comprising:

a cathode comprising a catalytic material for electrochemical generation of persulfate free radicals, wherein the catalytic material comprises a metal selected from the group consisting of iron, copper, nickel, cobalt, and metal alloys; and

an anode;

a source of a persulfate positioned upstream of the electrochemical cell and fluidly connectable to the source of water;

a first contaminant concentration sensor and a first water flow sensor positioned upstream of the electrochemical cell and fluidly connectable to the source of water;

a second water flow sensor positioned downstream of the electrochemical cell and fluidly connectable to the outlet of the electrochemical cell; and

a controller operatively coupled to receive a plurality of input signals,

wherein the plurality of input signals is received from at least the first contaminant concentration sensor and the second water flow sensor;

wherein, based on the input signals from the first contamination concentration sensor and the second water flow sensor, the controller is operable to generate:

a first control signal that regulates at least a rate of introduction of water from the source of water;

a second control signal that regulates at least a rate of persulfate introduction to the source of water; and

a third control signal that regulates at least a potential applied to the electrochemical cell.

2. The system of claim 1, wherein the first contaminant concentration sensor comprises an organic contaminant concentration sensor.

3. The system of claim 1, wherein the cathode material comprises copper.

4. The system of claim 1, wherein the anode comprises one of platinum, a Magneli phase titanium oxide, a mixed metal oxide (MMO) coated dimensionally stable anode (DSA) material, graphite, boron doped diamond (BDD), or lead/lead oxide.

5. The system of claim 1,

wherein at least one input signal of the plurality of input signals is received from the first water flow sensor; and

wherein the first control signal is further based on the at least one input signal received from the first water flow sensor.

6. The system of claim 1, further comprising a current sensor coupled to the electrochemical cell.

7. The system of claim 6,

wherein at least one input signal of the plurality of input signals is received from the current sensor; and

wherein the third control signal is further based on the at least one input signal received from the current sensor.

8. The system of claim 1, further comprising a second contaminant concentration sensor positioned downstream of the outlet of the electrochemical cell and fluidly connectable to the outlet of the electrochemical cell.