What is claimed is:

1. A treatment system for treating water in a flowing water system with a plasma discharge and ozone, the treatment system comprising:

a high voltage generator comprising a plurality of capacitors, resistors, and spark gap electrodes configured in a Marx ladder circuit, a support structure for the spark gap electrodes, and a housing;

a reaction chamber comprising an inlet configured to receive at least a portion of water flowing through the water system as water to be treated, an outlet configured to return the portion of water back to the water system after being treated with a plasma discharge and optionally ozone, and a reactor body;

a gas infusion system disposed upstream of the inlet or within the reaction chamber to add bubbles of one or more gases into the water to be treated;

a high voltage electrode and a ground electrode at least partially disposed in the reaction chamber and configured to generate a plasma discharge within the water in the reactor body when a high voltage pulse is produced by the high voltage generator;

an electrode mounting assembly disposed within the reaction chamber, the electrode mounting assembly configured to hold the high voltage electrode and the around electrode within the reactor body;

an optional conduit configured to deliver ozone gas produced in the high voltage generator from the housing to the gas infusion system; and

wherein at least a part of the high voltage electrode is configured to contact the water in the reactor body while the high voltage pulse is transmitted from the high voltage generator.

2. The treatment system of claim 1 wherein the electrode mounting assembly comprises:

a high voltage mounting base comprising a first central hub configured to receive the high voltage electrode, a first outer rim configured to mate with an interior wall of the reaction chamber, a plurality of spokes extending outwardly from the central hub toward the first outer rim and

a ground mounting base comprising a second central hub configured to receive the around electrode, a second outer rim configured to mate with the interior wall of the reaction chamber, and a substantially closed body disposed between the second hub and second outer rim.

3. The treatment of claim 2 wherein the substantially closed body of the ground electrode mounting base has a funnel or dome shape.

4. The treatment system of claim 2 wherein the high voltage mounting base and ground mounting base are configured to hold the high voltage electrode a fixed gap distance between around 1 and 10 mm from the ground electrode.

5. The treatment system of claim 4 wherein the ground electrode comprises a

substantially cylindrical and conductive tube having a plurality of apertures disposed through a sidewall of the tube, wherein the tube extends from the second hub toward the high voltage mounting base.

6. The treatment system of claim 5 wherein the high voltage electrode comprises a rod that is at least partially disposed within and substantially concentric with the ground electrode tube and wherein the gap distance is a radial distance between an exterior surface of the rod and interior surface of the tube.

7. The treatment system of claim 6, wherein around 4 to 30 mm of the rod is disposed within the ground electrode tube.

8. The treatment system of claim 5 wherein an exterior surface of the tube is coated with a dielectric barrier material.

9. The treatment system of claim 1 wherein the support structure for the spark gap electrodes comprises:

an upper support arm having a substantially rectangular configuration with an open central portion,

a lower support arm having a substantially rectangular configuration with an open central portion,

one or more vertical support arms connecting the upper support arm to the lower support arm in a spaced-apart relationship;

a plurality of spaced-apart post pairs, each pair comprising a first post extending vertically from a first side of the lower support arm and a second post extending vertically from a second side of the lower support arm substantially opposite the first side.

10. The treatment system of claim 9 wherein the upper support arm, lower support arm, and vertical support arms form an open, substantially U-shaped frame.

11. The treatment system of claim 9 wherein the support structure has dimensions of around 2 inches wide by 2 inches high to 3 inches wide by 3 inches high.

12. The treatment system of claim 9 wherein the support structure further comprises a plurality of electrode mounts, each mount extending inwardly from each of the first posts and each the second posts of the spaced-apart post pairs, wherein each electrode mount is attached to one of the spark gap electrodes to form a plurality of electrode pairs between each spaced-apart post pair; and wherein a gap distance between the spark gap electrodes in each electrode pair is around 15 mm to 40 mm.

13. The treatment system of claim 12 wherein the spark gap electrodes are configured to move laterally along the electrode mounts to selectively adjust the gap distance.

14. The treatment system of claim 13 wherein the electrode mounts comprises threads configured to mate with threads on the spark gap electrodes so that the spark gap electrodes may be rotated to achieve lateral movement along the electrode mounts.

15. The treatment system of claim 12 wherein the electrode mounts are configured to move laterally relative to the posts to selectively adjust the gap distance.

16. The treatment system of claim 1 further comprising an oil bath disposed within the housing.

17. The treatment system of claim 16 wherein the support structure comprises a lower support arm disposed below the spark gap electrodes and the lower support arm is submerged in the oil bath.

18. The treatment system of claim 16 wherein the capacitors are at least partially submerged in the oil bath.

19. The treatment system of claim 1 wherein the surfaces of the support structure are coated with oil.

20. The treatment system of claim 1 further comprising a venturi or vacuum pump to draw ozone generated in the high voltage generator into the conduit for delivery to the gas infusing system.

21. The treatment system of claim 1 further comprising an air pump to blow air through the high voltage generator.

22. The treatment system of claim 1 wherein for treating water in a flowing water system is a recirculating water system and wherein a conductivity level of the water in the recirculating water system increases as it recirculates and the gas infusion system is configured to begin supplying or increase an amount of gas supplied into the reactor body to generate the plasma discharge in the water as the conductivity level increases.