1. A vacuum pumping line plasma source comprising:

a body defining a generally cylindrical interior volume extending along a central longitudinal axis, the body having an input port for coupling to an input pumping line, an output port for coupling to an output pumping line, and an interior surface disposed about the generally cylindrical interior volume;

a supply electrode disposed adjacent to a return electrode;

a dielectric member, wherein at least one of the supply electrode or the return electrode is tightly surrounded by the dielectric member; and

a dielectric barrier discharge structure formed from the supply electrode, the return electrode, and the dielectric member, wherein at least a portion of the dielectric barrier discharge structure is disposed in the body or on the interior surface of the body, and the dielectric barrier discharge structure, which includes the dielectric member tightly surrounding at least one of the supply or return electrode, is adapted to generate a plasma in the generally cylindrical interior volume.

2. The vacuum pumping line plasma source of claim 1, wherein the return electrode is electrically grounded.

3. The vacuum pumping line plasma source of claim 1, wherein the return electrode comprises an electrically grounded portion of the body of the plasma source.

4. The vacuum pumping line plasma source of claim 1, wherein the return electrode and the supply electrode are tightly surrounded by the dielectric member.

5. The vacuum pumping line plasma source of claim 1, wherein the generally cylindrical interior volume extends substantially straight along the central longitudinal axis.

6. The vacuum pumping line plasma source of claim 1, wherein the dielectric member defines at least a portion of the generally cylindrical interior volume.

7. The vacuum pumping line plasma source of claim 1, wherein the supply electrode and the return electrode maintain about the same radial distance to the central longitudinal axis.

8. The vacuum pumping line plasma source of claim 1, further comprising a cooling channel embedded in the body, the cooling channel configured to conduct a cooling liquid through the body.

9. The vacuum pumping line plasma source of claim 1, further comprising one or more fins disposed on an exterior surface of the body for cooling the body.

10. The vacuum pumping line plasma source of claim 1, wherein the interior surface of the body comprises one or more metallic materials.

11. The vacuum pumping line plasma source of claim 1, further comprising a plurality of supply electrodes and a plurality of return electrodes positioned in an alternating arrangement along the central longitudinal axis.

12. The vacuum pumping line plasma source of claim 1, further comprising a secondary port disposed in the body and spaced from the input port and the output port, the secondary port configured to conduct a gas flow into the generally cylindrical interior volume of the body.

13. A method of manufacturing a vacuum pumping line plasma source, the method comprising:

providing a body defining a generally cylindrical interior volume extending along a central longitudinal axis, the body having an input port for coupling to an input of a pumping line, an output port for coupling to an output of the pumping line, and an interior surface disposed about the central longitudinal axis for defining the generally cylindrical interior volume;

locating a supply electrode adjacent to a return electrode;

tightly surrounding at least one of the supply electrode or the return electrode by a dielectric member such that at least a portion of the dielectric member is positioned between the supply electrode and the return electrode; and

creating a dielectric barrier discharge structure using the supply electrode, the return electrode, and the dielectric member, wherein at least a portion of the dielectric barrier discharge structure is disposed in the body or on the interior surface of the body, and the

dielectric barrier discharge structure, which includes the dielectric member tightly surrounding at least one of the supply or return electrode, is adapted to generate a localized plasma in the generally cylindrical interior volume.

14. The method of claim 13, further comprising grounding the return electrode.

15. The method of claim 13, further comprising forming the return electrode by electrically grounding at least one portion of the body.

16. The method of claim 13, further comprising tightly surrounding at least one of the return electrode or the supply electrode by the dielectric member.

17. The method of claim 13, further comprising defining at least a portion of the generally cylindrical volume by the dielectric member.

18. The method of claim 13, further comprising configuring the dielectric barrier discharge structure to generate the localized plasma with a power of about 20 watts to about 1000 watts.

19. The method of claim 13, wherein the generally cylindrical interior volume is coaxial with the pumping line.

20. The method of claim 13, further comprising using a co-fire technique to integrally form at least a portion of the dielectric barrier discharge structure including an isolation dielectric member, the dielectric member, and the supply electrode.

21. The method of claim 20, wherein the dielectric member and the isolation dielectric member comprise one or more ceramic materials.