CLAIMS

1. A power generation system comprising:

a) at least one vessel comprising a baseplate capable of a maintaining a pressure below atmospheric comprising a reaction chamber;

b) two electrodes each in fluid communication with molten metal contained in a corresponding reservoir, wherein the molten metal is configured to flow between the electrodes to complete a circuit;

c) a power source connected to said two electrodes comprising a cathode and anode to apply an ignition current therebetween when said circuit is closed;

d) optionally, a plasma generation cell (*e.g.*, glow discharge cell) to induce the formation of a first plasma from a gas; wherein effluence of the plasma generation cell is directed towards the circuit;

wherein when current is applied across the circuit, the effluence of the plasma generation cell undergoes a reaction to produce a second plasma and reaction products wherein energy from second plasma produces radiation;

e) a transparent window cavity to transmit radiation produced from the second plasma, wherein the transparent window cavity is in contact with the baseplate of the vessel;

f) a wet seal between the transparent window cavity and the baseplate comprising a wet seal molten metal, and

g) a power adapter configured to receive the radiation transmitted through the transparent window cavity and convert and/or transfer energy from the second plasma into mechanical, thermal, and/or electrical energy.

2. The power generation system of claim 1, wherein the molten metal is supplied to the electrodes to close the circuit by two molten metal injector systems that each form a molten metal stream in contact with one of the electrodes, wherein the molten metal streams intersect to close the circuit, and each molten metal injector system comprises:

a) at least a reservoir that contains some of the molten metal, a molten metal pump system configured to deliver the molten metal in the reservoir and through an injector tube to provide a molten metal stream, and the reservoir for receiving a returning molten metal stream following injection;

b) an inlet riser tube to control the molten metal level in the reservoir;

c) an electrical break in the wall of the reservoir to electrically isolate each of the corresponding electrodes from the electrode of opposite polarity, and

d) an alignment mechanism to change the orientation of the electrode injector such that the corresponded two streams of the two electrodes intersect to complete the circuit.

3. The power generation system of claim 1, wherein the vessel comprises a spherical, hemispherical, or parabolic dome section to which the reservoirs are connected and further comprises a drip edge at the connection to each outer reservoir.

4. The power generation system of claim 1, wherein the baseplate and vessel further comprises reflective liners of all the surfaces that are incident the plasma radiation and reflect the incident light through the window cavity to the power adapter wherein the liners further comprise penetrations for the injectors that are further covered by reflective penetration liners.

5. The power generation system of claim 1, wherein system further comprises an electromagnetic pump baseplate wherein the surfaces in contact with the molten metal are coated with a coating that prevents alloy formation with the molten metal.

6. The power generation system according to claim 1, wherein the vessel is connected to the window cavity and the wet seal further comprises:

a) a window flange at the base of the window cavity;

b) a baseplate flange on the baseplate;

c) a top flange on top of the window cavity flange having a mechanical connection to the baseplate flange to provide pressure on the window flange against the baseplate flange;

d) a gasket on a least one window cavity flange surface in contact with the top flange and the baseplate flange;

e) at least one of an inner circumferential housing or retention wall to the inside of the window cavity and an outer circumferential housing or retention wall to the outside of the window cavity flange, and

f) wet seal molten metal retained by the housing and retention wall and the gasket to maintain a lower pressure inside of the window cavity relative to outside to maintain a pressure differential.

7. The power generation system of claim 1, wherein the wet seal and window cavity further comprises a gasket interface comprising surfaces that permit relative moment between the gasket and the window cavity without destructive damage to the gasket.

8. The power generation system of claim 3, wherein the inner and outer reservoirs further comprise a thermal conductor and an electrical insulator which conduct heat positioned in the gap between the inner and outer reservoirs and permit heat conduction while maintaining the electrical isolation of the two electrodes.

9. The power generation system of claim 1, wherein said gas in the plasma generation cell comprises a mixture of hydrogen (H_2) and oxygen (O_2).

10. The power generation system of claim 1, wherein the vessel has a wet floor and/or a wet wall, and a baseplate or wall of the vessel has a layer of molten metal deposited thereon to reflect the second plasma light through the window cavity to the power adapter.

11. A power generation system comprising a magnetohydrodynamic wet seal for maintaining a vacuum on one side of a photovoltaic (PV) window comprising a cavity transparent to optical power; wherein the wet seal joins the PV window chamber and a baseplate and comprises a channel containing molten metal into which the PV window chamber is inserted;

wherein the molten metal is electrically connected to a power supply to create current in the molten metal in the channel to induce magnetorestriction of the molten metal in the housing to maintain the seal;

wherein light is generated on one side of the PV window, transmitted through the window, and collected in at least one photovoltaic cell to generate electrical power.

12. The power generation system of claim 11, wherein the molten metal is exposed to magnetic field such that the Lorentz force of the current and magnetic field on the molten metal in the channel is directed against external forces on the molten metal to maintain the wet seal.

13. A wet seal for maintaining a vacuum on one side of a photovoltaic (PV) window comprising a cavity transparent to optical power; wherein the wet seal joins a PV window chamber and a baseplate (*e.g.*, a baseplate of the vessel having penetrations for the tops of one or more reservoirs) and comprises a channel containing molten metal into which the PV window chamber

is inserted;

wherein the molten metal rotates such that the centrifugal force pushes radially on the molten metal to maintain the seal against external forces.

14. A wet seal for maintaining a vacuum on one side of a photovoltaic (PV) window comprising a cavity transparent to optical power;

wherein the seal comprises an electrically insulated channel dimensioned for the photovoltaic window chamber to be inserted therein and extending around the PV window chamber when the PV window chamber is inserted in the channel;

wherein the channel is filled with molten metal;

wherein the electrically insulated channel has at least one positive lead electrode and at least one negative lead electrode at different points of the channel;

at least one current is applied through the molten metal in the channel, and the molten metal is exposed to at least one magnetic field applied by at least one magnet to create at least one Lorentz force along a section of the channel wherein the electrodes and magnets are configured and oriented such that the Lorentz forces of the corresponding currents and magnetic fields are in the vector directions to oppose the atmospheric pressure force on the molten metal in the channel to produce a vacuum seal, the Lorentz forces of the currents and magnetic fields are sufficient to maintain a pressure difference.

15. The wet seal of claim 14, wherein the seal comprises two or more electrically insulated channels; wherein each channel has at least one positive lead electrode and negative lead electrode;

wherein when the PV window chamber comprising at least one edge is inserted into at least one channel, each channel is independently filled with molten metal such that the two or more channels together extend around the PV window, and

the current or currents in each channel is independently biased and together interact with independent Lorentz fields to maintain a pressure difference.

16. A method of maintaining a pressure difference between two sides of a first solid material comprising:

a) mating the first solid material and the second solid material with the molten metal

disposed therebetween; wherein when mated, the molten metal has a magnetic field applied thereto;

b) applying a current through the molten metal;

c) reducing the pressure on the molten metal;

wherein the force created by the current and the magnetic field opposes the force created by the reduction of pressure to maintain the pressure difference.

17. The wet seal of claim 11, wherein the PV window forms a PV window cavity having a flange at its base, and the PV window flange is seated on a window cavity baseplate; wherein the magnetohydrodynamic wet seal between the PV window cavity flange and the window cavity baseplate further comprising comprises:

a) a molten metal reservoir circumferential to the PV window cavity flange that supplies molten metal to a gap between the bottom of the PV window flange and a portion of the baseplate;

b) a continuous separator in a gap between an outer wall of the molten metal reservoir wall and a vertical edge of the PV window flange and the gap between the bottom of the PV window flange and the baseplate;

c) a source of magnetic field such as a permanent magnet, wherein the magnetic field produced from the source of the magnetic field is perpendicular to the gap between the PV window flange and the baseplate;

d) a current supply and electrodes on opposite sides of the continuous separator connected to the molten metal to supply current to the corresponding tin or gallium wet seal circuit, wherein the current, in the presence of the crossed magnetic field, produces a radial MHD force in the gap between the PV window flange and the baseplate, and

e) an MHD-atmospheric pressure force balance processor operably connected to sensors of the wet seal position such as at least one optical sensor and one conductivity sensor, an MHD current sensor and controller, an evacuation rate sensor such as a pressure gauge and controller such as at least one of a vacuum value such as a needle valve and its controller and a vacuum pump and its controller wherein the MHD-atmospheric pressure force balance processor may receive sensor input and reiteratively adjust the MHD current and vacuum rate to achieve and maintain a stable wet seal as and when the PV window cavity is evacuated.

18. The wet seal of claim 17, wherein the MHD-atmospheric pressure force balance processor sets the current supply controller to provide a current corresponding to an increased MHD force relative to the maximum atmospheric force, whereby as a vacuum inside the PV window cavity, the outer atmospheric pressure causes more molten metal (*e.g.*, tin or gallium) to flow into the gap between PV window flange and the baseplate to cause an increase in the width of the wet seal and an increase in MHD current flow with a concomitant increase in the opposing MHD force until a steady state wet seal is established.