Claims

1. An electrical generator system (10,110,210) including:

a radionuclide material (14,114,214);

metal electrodes (24,26,124,126,224,226); and

electrical contacts connected to said electrodes (24, 26,124,126,224,226), said electrical contacts are adapted to facilitate flow of electrical energy when connected to a load;

characterised in that the system further includes a thin layer of zinc oxide (22,122,222) having a thickness between 150-1500nm, said thin layer of zinc oxide being in direct contact with at least one of the electrodes (24, 26,124,126,224,226) and forming a metal-semiconductor junction therebetween; and in that radioactive emissions received from said radionuclide material are converted into electrical energy at said metal-semiconductor junction.

2. The electrical generator system (10,110,210) of claim 1, characterised in that said zinc oxide layer (22,122,222) is formed on a substrate material (18,132,232).

3. The electrical generator system (10,110,210) of claim 2, characterised in that said substrate material (18,132,232) is selected from glass, sapphire or quartz.

4. The electrical generator system (10,110,210) according to claim 2 or claim 3, characterised in that a layer of a doped metal oxide material (20,120,220) is disposed between the zinc oxide layer (22,122,222) and the substrate (18,132,232).

5. The electrical generator system (10,110,210) according to claim 4, characterised in that one of said metal electrodes (24, 26,124,126,224,226) is disposed in direct contact with said doped metal oxide material (20,120,220).

6. The electrical generator system (10,110,210) according to any one of the preceding claims, characterised in that said thin layer of zinc oxide (22,122,222) is formed by an RF magnetron sputter process.

7. The electrical generator system (10,110,210) according to any one of the preceding claims, characterised in that said metal electrodes (24, 26,124,126,224,226) are formed of gold, silver or aluminium.

8. The electrical generator system (10,110,210) according to any one of the preceding claims, characterised in that said metal electrodes (24, 26,124,126,224,226) are deposited on said zinc oxide (22,122,222) by a sputtering process or electrochemical vapour deposition.

9. The electrical generator system (10,110,210) according to any one of the preceding claims, characterised in that said radionuclide material (14,114,214) is encased in a seal material (16).

10. The electrical generator system (10,110,210) according to claim 9, characterised in that said seal material (16) is selected from aluminium, a metal alloy, plastic or Mylar.

11. The electrical generator system (10,110,210) according to any one of the preceding claims, characterised in that said radionuclide material (14,114,214) is selected from Sr-90, Pm-147, Ni-63 or H-3.

12. The electrical generator system (10,110,210) according to claim 1, characterised in that the thickness of the zinc oxide layer (22,122,222) is equal to or less than 1250nm.

13. An electrical power supply device (10,110,210) including a housing enclosing an electrical generator system according to any one of the preceding claims.

14. The device (10,110,210) of claim 13, characterised in that there are multiple layers of zinc oxide (22,122,222), each layer having corresponding metal electrodes (24, 26,124,126,224,226) and electrical contacts, wherein adjacent layers are separated by an insulating substrate material (18,132,232).