

Claims

What is claimed is:

1. A zinc-air fuel cell with multiple electric connectors, comprising:
 - a case forming a space;
 - a plurality of gas chambers disposed in the space;
 - two air electrode layers disposed in the space and serving as positive electrodes for discharging in a chemical reaction;
 - a metal layer disposed in the space and serving as a positive electrode for charging in the chemical reaction;
 - a zinc material disposed in the space and serving as a negative electrode to go with the air electrode layers for discharging in the chemical reaction or a negative electrode to go with the metal layer for charging in the chemical reaction;
 - a plurality of separators disposed in the space, respectively disposed between the air electrode layers and the metal layer so that the air electrode layers, the zinc material and the metal layer are separately arranged; and
 - an electrolyte disposed in the space, capable of flowing to pass through the separators and in contact with the air electrode layers, with the metal layer and with the zinc material so that the air electrode layers, the zinc material and the metal layer are respectively electrically connected.
2. The zinc-air fuel cell with multiple electric connectors of Claim 1, wherein the case comprising a polyarylsulfone material and formed by an insert molding method to prevent the electrolyte from leaking.
3. The zinc-air fuel cell with multiple electric connectors of Claim 1, further comprising:
 - a transport device connected to the space to regulate a height of the electrolyte in the space.
4. The zinc-air fuel cell with multiple electric connectors of Claim 3, wherein the transport device regulates input of the electrolyte into the space.

5. The zinc-air fuel cell with multiple electric connectors of Claim 3, wherein the transport device regulates output of the electrolyte from the space.
6. The zinc-air fuel cell with multiple electric connectors of Claim 3, wherein the transport device regulates input of gas into the space.
7. The zinc-air fuel cell with multiple electric connectors of Claim 3, wherein the transport device regulates output of gas from the space.
8. The zinc-air fuel cell with multiple electric connectors of Claim 3, wherein the zinc-air fuel cell with multiple electric connectors is activated for a charge reaction or for a discharge reaction when the height enables the electrolyte in contact with the air electrode layers, with the metal layer and with the zinc material simultaneously.
9. The zinc-air fuel cell with multiple electric connectors of Claim 3, wherein the zinc-air fuel cell with multiple electric connectors is activated for a discharge reaction when the height enables the electrolyte in contact with the air electrode layers and with the zinc material simultaneously.
10. The zinc-air fuel cell with multiple electric connectors of Claim 3, wherein the zinc-air fuel cell with multiple electric connectors is activated for a charge reaction when the height enables the electrolyte in contact with the metal layer and with the zinc material simultaneously.
11. The zinc-air fuel cell with multiple electric connectors of Claim 1, wherein the zinc-air fuel cell with multiple electric connectors is deactivated for a chemical reaction when the electrolyte is in contact with one of the air electrode layers, the metal layer and the zinc material.

12. The zinc-air fuel cell with multiple electric connectors of Claim 1, wherein the gas chambers buffer gas circulation.

13. The zinc-air fuel cell with multiple electric connectors of Claim 1, wherein the gas chambers buffer electrolyte circulation.

14. The zinc-air fuel cell with multiple electric connectors of Claim 1, further comprising:

two conductive layers, disposed on two sides of the space to be adjacent to and in contact with the zinc material to accommodate the zinc material.

15. The zinc-air fuel cell with multiple electric connectors of Claim 14, wherein at least one of the conductive layers has a central region lower than a peripheral region to form a recess to accommodate the zinc material.

16. The zinc-air fuel cell with multiple electric connectors of Claim 1, wherein the zinc material is selected from a group consisting of flowable zinc slurry, zinc particles or a zinc plate.

17. The zinc-air fuel cell with multiple electric connectors of Claim 1, wherein the air electrode layers comprise a first air electrode layer and a second air electrode layer, and the first air electrode layer, the metal layer, the zinc material and the second air electrode layer are vertically arranged.

18. The zinc-air fuel cell with multiple electric connectors of Claim 17, wherein the first air electrode layer is the topmost layer, the zinc material is the bottommost layer, and the metal layer is disposed between the first air electrode layer and the zinc material.

19. The zinc-air fuel cell with multiple electric connectors of Claim 1, wherein the zinc material comprises a first negative electrode

and a second negative electrode, the air electrode layers comprise a first positive electrode and a second positive electrode; the first negative electrode as well as the second negative electrode are disposed between the first positive electrode, the second positive electrode and the positive electrode for charging.