Claims

1. An energy storage device comprising:

a housing defining an internal space;

an electrolyte-impermeable-barrier-member disposed within the internal space of the housing, the electrolyte-impermeable-barrier-member comprising a base portion and at least one side wall extending from the base portion of the electrolyte-impermeable-barrier-member to form a receptacle structure,

wherein the electrolyte-impermeable-barrier-member partitions the internal space of the housing into a receptacle space bound by the electrolyte-impermeable-barrier-member and an intervening space between the housing and the electrolyte-impermeable-barrier-member,

wherein the receptacle structure forming the electrolyte-impermeable-barrier-member comprises at least one through-hole serving as a channel connecting the receptacle space and the intervening space;

a first electrode disposed in the intervening space between the housing and the electrolyte-impermeable-barrier-member;

a second electrode disposed in the receptacle space within the electrolyte-impermeable-barrier-member; and

an electrolyte disposed with respect to the electrolyte-impermeable-barrier-member in a manner so as to be shielded by the electrolyte-impermeable-barrier-member from direct contact with the housing,

wherein the electrolyte is at least partially contained within the receptacle space of the electrolyte-impermeable-barrier-member, interacts with the second electrode within the receptacle space of the electrolyte-impermeable-barrier-member, and reaches through the at least one through-hole of the electrolyte-impermeable-barrier-member to interact with the first electrode within the intervening space between the housing and the electrolyte-impermeable-barrier-member.

2. The energy storage device according to claim 1,

wherein the electrolyte is an aqueous electrolyte.

3. The energy storage device according to claim 1 or claim 2,

wherein the housing comprises a base portion and at least one side wall extending from the base portion of the housing,

wherein the electrolyte-impermeable-barrier-member is oriented with the at least one side wall of the electrolyte-impermeable-barrier-member aligned to the at least one side wall of the housing,

wherein the electrolyte is disposed with respect to the electrolyte-impermeable-barrier-member such that the at least one side wall of the electrolyte-impermeable-barrier-member shields the electrolyte from the at least one side wall of the housing.

4. The energy storage device according to any one of claims 1 to 3, further comprising:

an electrolyte-permeable-member disposed within the receptacle space of the electrolyte-impermeable-barrier-member;

wherein the electrolyte-permeable-member covers over the at least one through-hole of the electrolyte-impermeable-barrier-member from within the electrolyte-impermeable-barrier-member.

5. The energy storage device according to any one of claims 1 to 4,

wherein the at least one through-hole of the electrolyte-impermeable-barrier-member is at the base portion of the electrolyte-impermeable-barrier-member,

wherein the base portion of the electrolyte-impermeable-barrier-member is stacked directly on the first electrode,

wherein the second electrode is disposed within the receptacle space of the electrolyte-impermeable-barrier-member and above the base portion of the electrolyte-impermeable-barrier-member.

6. The energy storage device according to claim 5,

wherein the housing is of a cylindrical shape and the electrolyte-impermeable-barrier-member is of a cylindrical shape,

wherein the electrolyte-impermeable-barrier-member and the housing are aligned in a coaxial manner, and

wherein the first electrode is sandwiched between the base portion of the electrolyte-impermeable-barrier-member and the base portion of the housing.

7. The energy storage device according to any one of claims 1 to 6, further comprising

a plug removably attached to an opening of the electrolyte-impermeable-barrier-member opposite the base portion of the electrolyte-impermeable-barrier-member to close the electrolyte-impermeable-barrier-member for encasing the second electrode within the electrolyte-impermeable-barrier-member;

wherein the plug comprises an engagement element configured to engage a corresponding engagement element at the at least one side wall of the electrolyte-impermeable-barrier-member for removable attachment of the plug to the electrolyte-impermeable-barrier-member.

8. The energy storage device according to claim 7,

wherein the plug is inserted into the opening of the electrolyte-impermeable-barrier-member to close the electrolyte-impermeable-barrier-member.

9. The energy storage device according to claim 7 or claim 8,

wherein the engagement element of the plug and the corresponding engagement element of the electrolyte-impermeable-barrier-member are engaged to each other via a snap-fit engagement, a press-fit engagement, a friction-fit engagement, a magnetic engagement, or a ferromagnetic engagement element, or a threaded engagement.

10. The energy storage device according to any one of claims 7 to 9,

wherein the plug comprises an auxiliary engagement element directed outwards and away from the electrolyte-impermeable-barrier-member,

wherein the auxiliary engagement element is configured to removably couple with an external tool in a manner so as to move the plug using the external tool for disengaging the engagement element of the plug from the corresponding

engagement element of the electrolyte-impermeable-barrier-member so as to remove the plug from the electrolyte-impermeable-barrier-member.

11. The energy storage device according to any one of claims 8 to 10, further comprising:

a cap member covered over an opening of the housing opposite the base portion of the housing.

12. The energy storage device according to any one of claims 1 to 11,

wherein the electrolyte-impermeable-barrier-member is made of a polypropylene material.

13. A method of assembling an energy storage device, the method comprising:

providing a housing which defines an internal space;

disposing a first electrode into the internal space of the housing;

disposing an electrolyte-impermeable-barrier-member, which comprises a base portion and at least one side wall extending from the base portion of the electrolyte-impermeable-barrier-member forming a receptacle structure, into the internal space of the housing in a manner so as to partition the internal space of the housing into a receptacle space bound by the electrolyte-impermeable-barrier-member and an intervening space between the housing and the electrolyte-impermeable-barrier-member, wherein the first electrode is in the intervening space between the housing and the electrolyte-impermeable-barrier-member;

disposing a second electrode in the receptacle space within the electrolyte-impermeable-barrier-member,

disposing an electrolyte with respect to the electrolyte-impermeable-barrier-member in a manner so as to shield the electrolyte from direct contact with the housing,

wherein the electrolyte is disposed in a manner such that it is at least partially contained within the receptacle space, interacts with the second electrode within the receptacle space of the electrolyte-impermeable-barrier-member, and reaches through at least one through-hole of the receptacle structure of the electrolyte-impermeable-barrier-member to interact with the first electrode within the

intervening space between the housing and the electrolyte-impermeable-barrier-member, wherein the at least one through-hole serves as a channel connecting the receptacle space of the electrolyte-impermeable-barrier-member and the intervening space between the housing and the electrolyte-impermeable-barrier-member.

14. The method according to claim 13,

wherein disposing the second electrode in the receptacle space within the electrolyte-impermeable-barrier-member is subsequent to disposing the electrolyte with respect to the electrolyte-impermeable-barrier-member.

15. The method according to claim 13 or 14,

wherein disposing the first electrode into the internal space of the housing comprises placing the first electrode on a base portion of the housing, wherein the housing comprises the base portion and at least one side wall extending from the base portion of the housing.

16. The method according to any one of claims 13 to 15, further comprising:

disposing an electrolyte-permeable-member within the receptacle space of the electrolyte-impermeable-barrier-member to cover over the at least one through-hole of the electrolyte-impermeable-barrier-member from within the electrolyte-impermeable-barrier-member.

17. The method according to claim 15 or 16,

wherein disposing the electrolyte-impermeable-barrier-member into the internal space of the housing comprises stacking the base portion of the electrolyte-impermeable-barrier-member directly on the first electrode, wherein the at least one through-hole of the electrolyte-impermeable-barrier-member is at the base portion of the electrolyte-impermeable-barrier-member.

18. The method according to claim 17,

wherein disposing the second electrode in the receptacle space within the electrolyte-impermeable-barrier-member comprises placing the second electrode above the base portion of the electrolyte-impermeable-barrier-member.

19. The method according to any one of claims 13 to 18, further comprising

attaching a plug to an opening of the electrolyte-impermeable-barrier-member opposite the base portion of the electrolyte-impermeable-barrier-member to close the electrolyte-impermeable-barrier-member for encasing the second electrode within the electrolyte-impermeable-barrier-member,

wherein the plug comprises an engagement element configured to engage a corresponding engagement element at the at least one side wall of the electrolyte-impermeable-barrier-member for removable attachment of the plug to the electrolyte-impermeable-barrier-member.

20. The method according to claim 19,

wherein attaching the plug to the opening of the electrolyte-impermeable-barrier-member comprises

moving the plug via an external tool removably coupled to an auxiliary engagement element of the plug to engage an engagement element of the plug with the corresponding engagement element of the electrolyte-impermeable-barrier-member for attaching the plug to the opening of the electrolyte-impermeable-barrier-member, wherein the auxiliary engagement element of the plug is directed outwards and away from the electrolyte-impermeable-barrier-member, and

decoupling the external tool from the auxiliary engagement element of the plug after the plug is attached to the opening of the electrolyte-impermeable-barrier-member.