

## CLAIMS

What is claimed is:

- 5 1. An electrochemical cell for producing electrical energy via an electrochemical reaction comprising an anode and a cathode;  
and wherein at least one of the anode and the cathode comprise a solid ionically conducting polymer material;  
wherein the solid ionically conducting polymer material can ionically conduct hydroxyl ions,  
10 whereby the solid ionically conducting polymer material can conduct hydroxyl ions during said electrochemical reaction.
2. The cell of claim 1, wherein the cathode can produce hydroxyl ions during the electrochemical reaction.
- 15 3. The cell of claim 1, wherein the solid ionically conducting polymer material has a crystallinity index of at least or greater than about 30%.
4. The cell of claim 1, wherein the solid ionically conducting polymer material comprises at  
20 least one hydroxyl ion and has an OH<sup>-</sup> diffusivity greater than  $10^{-11}$  at a temperature in the range of 20°C to 26°C.
5. The cell of claim 1, wherein the cathode comprises an active material that generates a hydroxyl ion during electrochemical reaction.
- 25 6. The cell of claim 1, wherein the anode comprises the solid ionically conducting polymer material and further comprises an anode electrochemically active material, wherein the solid ionically conducting polymer material and anode electrochemically active material are mixed, whereby the solid ionically conducting polymer material can ionically conduct hydroxyl ions to the  
30 anode electrochemically active material.
7. The cell of claim 1, wherein the cathode comprises the solid ionically conducting polymer material and further comprises a cathode electrochemically active material, wherein the solid

ionically conducting polymer material and cathode electrochemically active material are mixed, whereby the solid ionically conducting polymer material can ionically conduct hydroxyl ions to the cathode electrochemically active material.

5     8.     The cell of claim 6, wherein at least a portion of the solid ionically conducting polymer material is in contact with the anode electrochemically active material.

9.     The cell of claim 7, wherein at least a portion of the solid ionically conducting polymer material is in contact with the cathode electrochemically active material.

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10.     The cell of claim 1, wherein the cathode comprises manganese dioxide, and wherein the cell has a specific capacity greater than 308 mAh/g manganese dioxide.

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11.     The cell of claim 1, wherein the solid ionically conducting polymer material is positioned interposed between the anode and cathode whereby the solid ionically conducting polymer material conducts hydroxyl ions between the anode and cathode.

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12.     The cell of claim 1, wherein the cathode comprises the solid ionically conducting polymer material, and wherein the amount of the solid ionically conducting polymer material ranges between 1 and 40 weight percent of the cathode.

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13.     The cell of claim 1, wherein the cell is rechargeable, and wherein the cathode comprises the manganese dioxide, and wherein the amount of manganese dioxide ranges between 20 and 90 weight percent of the cathode.

14.     The cell of claim 1, wherein the cell is primary, and wherein the cathode comprises the manganese dioxide, and wherein the amount of manganese dioxide ranges between 50 and 95 weight percent of the cathode.

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15.     The cell of claim 1, wherein the cell further comprises a liquid electrolyte, wherein the liquid electrolyte comprises hydroxyl ions.

16. The cell of claim 1, wherein both the anode and cathode comprise the solid ionically conducting polymer material, wherein the cell is solid state and does not contain any liquid electrolyte, whereby ionic conductivity of the cell is enabled via the solid ionically conducting polymer material.

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17. The cell of claim 1, wherein the anode comprises zinc, and the cathode comprises manganese dioxide, wherein the cell is primary.

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18. The cell of claim 1, wherein the anode comprises zinc, and the cathode comprises manganese dioxide, wherein the cell is secondary.

19. The cell of claim 1, wherein the anode comprises aluminum, and the cathode comprises manganese dioxide, wherein the cell is primary.

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20. The cell of claim 1, wherein the anode comprises zinc, and the cathode is fluidly connected to oxygen, whereby the oxygen acts as a cathode electrochemically active material.