CLAIMS

1. A method of preparing an oxyhydroxide catalyst, the method comprising:
   (i) preparing a pre-catalyst comprising cobalt(II) chloride and iron(III) chloride; and
   (ii) electrochemically oxidizing the pre-catalyst to form the oxyhydroxide catalyst.

2. The method of claim 1, wherein the method does not comprise a sol-gel process, a hydrothermal process, and/or a solvothermal process.

3. The method of claim 1 or 2, further comprising, before step (ii):
   (i-a) applying the pre-catalyst to a conductive substrate, wherein the pre-catalyst is allowed to dry on the conductive substrate under ambient conditions.

4. The method of any one of claims 1 to 3, wherein the pre-catalyst in step (i) and step (i-a) does not contain oxyhydroxides.

5. The method of claim 3 or 4, comprising at least one of (a) to (e):

   (a) wherein the pre-catalyst is applied on the conductive substrate with a mass loading of about 0.03 to about 0.08 mg/cm^2;

   (b) wherein the conductive substrate is coated on an electrode;

   (c) wherein the conductive substrate has a BET surface area of about 50 m^2/g to about 1500 m^2/g;

   (d) wherein the conductive substrate has an electrical conductivity of about 0.05 S cm^{-1} to about 3 S cm^{-1}; and

   (e) wherein the conductive substrate is selected from the group consisting of carbon black and acetylene black.

6. The method of any one of claims 1 to 5, wherein step (ii) comprises applying a voltage to the pre-catalyst.

7. The method of claim 6, wherein the voltage follows a reversible cyclic voltammetry waveform.

8. The method of claim 7, wherein the reversible cyclic voltammetry is performed for about 10 to about 30 cycles.

9. The method of any one of claims 1 to 8, comprising at least one of (a) to (e):

   (a) wherein the pre-catalyst comprises cobalt(II) chloride hexahydrate and iron(III) chloride hexahydrate;

(b) wherein the molar ratio of cobalt to iron in the pre-catalyst is about 3:1 to about 5:1;

(c) wherein the pre-catalyst further comprises a solvent selected from the group consisting of water, alcohols, ethers, ketones, and mixtures thereof;

(d) wherein the pre-catalyst further comprises a binder; and

(e) wherein the pre-catalyst does not comprise a polymer.

10. The method of any one of claims 1 to 9, comprising at least one of (a) to (d):

(a) wherein the oxyhydroxide catalyst comprises oxyhydroxides having a di-μ-oxo motif;

(b) wherein the oxyhydroxide catalyst does not contain Cl;

(c) wherein the oxyhydroxide catalyst is amorphous or generally not crystalline; and

(d) wherein the oxyhydroxide catalyst comprises $Co(Fe)O_xH_y$, $Co_2O_2(OH)$, CoO(OH), and/or FeO(OH), wherein x is an integer in the range of 1 to 3 and y is an integer in the range of 0 to 1.

11. An oxyhydroxide catalyst prepared by electrochemically oxidizing a pre-catalyst comprising cobalt(II) chloride and iron(III) chloride.

12. The oxyhydroxide catalyst of claim 11, wherein the oxyhydroxide catalyst is not prepared via a sol-gel process, a hydrothermal process, and/or a solvothermal process.

13. The oxyhydroxide catalyst of claim 11 or 12, wherein the pre-catalyst does not contain oxyhydroxides.

14. A pre-catalyst for preparing an oxyhydroxide catalyst, wherein:
the pre-catalyst comprises cobalt(II) chloride and iron(III) chloride;
the pre-catalyst is applied on a conductive substrate, wherein the pre-catalyst is allowed to dry on the conductive substrate under ambient conditions; and
the pre-catalyst does not contain oxyhydroxides.

15. The pre-catalyst of claim 14, wherein the pre-catalyst is not involved in a sol-gel process, a hydrothermal process, and/or a solvothermal process.