CLAIMS:

1. A fuel cell comprising:

a cathode;

an electrolyte; and

a reduced anode separated from the cathode by the electrolyte, wherein the reduced anode includes a Ni phase constitution, an ionic phase, and a single ceramic phase of a $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having a Mn-based Ruddlesden-Popper (R-P) phase constitution, wherein n is equal to or greater than one, wherein x is a value such that both La and Sr are present in the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound, and wherein the anode, cathode, and electrolyte are configured to form an electrochemical cell.

2. The fuel cell of claim 1, wherein the Ni phase constitution and the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having a Mn-based R-P phase constitution, of n greater than or equal to 1, is formed via a reduction of a Mn and Ni mixed B-site compound having a pervoskite structure or Ruddlesden-Popper compound that is present following an initial anode processing step.

3. The fuel cell of claim 2, wherein the Mn and Ni mixed B-site compound comprises a $(La_{1-x}Sr_x)(Mn_{1-y}Ni_y)O_3$ compound.

4. The fuel cell of claim 3, wherein additional A-site and B-site dopants are included, wherein the A-site dopants include one or more of Pr and Ca and the B-site dopants include one or more of Cu, Co, Zn, Fe and Ti.

5. The fuel cell of claim 3, wherein the mole fraction (1-y) of Mn on the B-site is approximately 0.5 or greater.

6. The fuel cell of claim 2, wherein the Mn and Ni mixed B-site compound comprises a $(La_{1-x}Sr_x)_{n+1}(Ni_{1-y}Mn_y)_nO_{3n+1}$ Ruddlesden-Popper compound.

7. The fuel cell of claim 1, wherein the reduced anode includes between approximately 82 and approximately 95 wt% of the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having the Mn-based R-P phase constitution and between 5-18 wt% of the Ni phase.

8. The fuel cell of claim 1, wherein the Ni phase constitution and the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having a Mn-based R-P phase constitution, of n greater than or equal to 1, is formed by adding thean ionic phase including yttria and/or scandia stabilized zirconia or rare-earth oxide stabilized ceria to the Ni plus $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ Mn-based R-P phases in an amount of 35-65 weight percent.

9. The fuel cell of claim 1, wherein the anode consists essentially of the Ni phase constitution, the ionic phase, and the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having the Mn-based R-P phase constitution.

10. The fuel cell of claim 1, further comprising an anode conductive layer adjacent the anode, wherein the anode conductive layer comprises a cermet, where the metal phase comprises Ni.

11. The fuel cell of claim 10, wherein the metal phase is alloyed with one or more of Pt, Pd, Cu, Co, Au, and Ag.

12. A method comprising forforming a fuel cell, the method comprisingfuel cell including:

forming a cathode;

forming an electrolyte; and

forming a reduced anode, wherein the reduced anode is separated from the cathode by the electrolyte, wherein the reduced anode includes a Ni phase constitution,

an ionic phase, and a single ceramic phase of a $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having a Mn-based Ruddlesden-Popper (R-P) phase constitution, wherein n is equal to or greater than one, wherein x is a value such that both La and Sr are present in the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound, and wherein the anode, cathode, and electrolyte are configured to form an electrochemical cell.

13. The method of claim 12, wherein forming the reduced anode includes~~further comprising~~ forming the reduced anode via a reduction of a Mn and Ni mixed B-site compound having a pervoskite structure or Ruddlesden-Popper compound that is present following an initial anode processing step.

14. The method of claim 13, wherein the Mn and Ni mixed B-site compound comprises a $(La_{1-x}Sr_x)(Mn_{1-yx}Ni_{xy})O_3$ compound.

15. The method of claim 14, wherein additional A-site and B-site dopants are included, wherein the A-site dopants include one or more of Pr and Ca and the B-site dopants include one or more of Cu, Co, Zn, Fe and Ti.

16. The method of claim 14, wherein the mole fraction (1-yx) of Mn on the B-site is approximately 0.5 or greater.

17. The method of claim 13, wherein the Mn and Ni mixed B-site compound comprises a $(La_{1-x}Sr_x)_{n+1}(Ni_{1-yx}Mn_{xy})_nO_{3n+1}$ Ruddlesden-Popper compound.

18. The method of claim 12, wherein the reduced anode includes between approximately 82 and approximately 95 wt% of the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having the Mn-based R-P phase constitution and between 5-18 wt% of the Ni phase.

19. The method of claim 12, wherein the Ni phase constitution and the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having a Mn-based R-P phase constitution, of n greater

than or equal to 1, is formed by adding the~~an~~ ionic phase including yttria and/or scandia stabilized zirconia or rare-earth oxide stabilized ceria to the Ni plus $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ Mn-based R-P phases in an amount of 35-65 weight percent.

20. The method of claim 12, wherein the anode consists essentially of the Ni phase constitution, the ionic phase, and the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having the Mn-based R-P phase constitution.

21. The method of claim 12, further comprising an anode conductive layer adjacent the anode, wherein the anode conductive layer comprises a cermet, where the metal phase comprises Ni.

22. The method of claim 12~~10~~, wherein the metal phase is alloyed with one or more of Pt, Pd, Cu, Co, Au, and Ag.

23. A method of forming a fuel cell, the method comprising:

forming an electrolyte on adjacent an as-processed anode; and

forming a cathode on the electrolyte, wherein the electrolyte separates the as-processed anode from a cathode, wherein the as-processed anode includes $(La_{1-x}Sr_x)(Mn_yNi_{1-y})O_3$ or mixtures of $(La_{1-x}Sr_x)(Mn_yNi_{1-y})O_3$ plus an ionic phase, wherein a composition of the as-processed anode is selected such that upon reduction of the as-processed anode a resulting reduced anode includes a Ni phase constitution, an ionic phase, and a single ceramic phase of $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound having a Mn-based Ruddlesden-Popper (R-P) phase constitution, wherein x is a value such that both La and Sr are present in the $(La_{1-x}Sr_x)_{n+1}Mn_nO_{3n+1}$ compound, and wherein the anode, cathode, and electrolyte are configured to form an electrochemical cell.