CLAIMS:

1. A method for treating a reforming catalyst in a reactor, the method comprising:

reforming a gas stream in the reactor, the gas stream including hydrocarbons using a treated catalyst metal to convert at least a portion of the hydrocarbons to hydrogen in the gas stream;

periodically treating, while reforming the gas stream, the catalyst metal in a reducing gas mixture environment, wherein the reducing gas mixture comprises hydrogen and at least one sulfur-containing compound, wherein the at least one sulfur-containing compound includes one or more of hydrogen sulfide, carbonyl sulfide, carbonyl disulfide and organic sulfur-containing compounds, wherein periodically treating the catalyst metal while reforming the gas stream includes treating the catalyst metal with a total sulfur dose per treatment by periodically adding the sulfur-containing compound to the reactor with the gas stream, wherein the total sulfur dose per treatment is defined by a sulfur level in the reducing gas mixture and exposure time of the catalyst metal to the reducing gas mixture during the treatment, wherein the total sulfur dose per treatment is such that there is a decrease in a rate of deactivation of the catalyst metal during the reforming of the gas stream compared to the rate of deactivation of the catalyst metal not treated with the total sulfur dose; and

supplying the reformed gas stream to the fuel side of a solid oxide fuel cell stack as a fuel source to generate electricity via an electrochemical reaction using the reformed gas stream as a fuel source, wherein a concentration of sulfur in the reducing gas mixture during each treatment is between approximately 5 parts per billion volume (ppb-v) and approximately 200 ppb-v.

2. The method of claim 1, wherein the total sulfur dose per treatment is such that catalyst performance is stabilized without substantially negatively impacting activity of the catalyst metal.

3. The method of claim 1, wherein treating the catalyst metal comprises heating the catalyst metal, within the reactor, to a temperature between approximately 350 to 1,200 degrees Celsius.

4. The method of claim 1, wherein reforming the gas stream including the hydrocarbons using the treated catalyst metal comprises steam reforming the gas stream including the hydrocarbons using the treated catalyst metal.

5. The method of claim 1, wherein the decrease in the rate of deactivation of the catalyst metal is at least 30 percent compared to the rate of deactivation of the catalyst metal not treated with the total sulfur dose.

6. The method of claim 1, wherein a concentration of sulfur in the reducing gas mixture during each treatment is between approximately 0.005 to approximately 10 parts per million volume (ppm-v).

7. The method of claim 1, wherein the total sulfur dose is such that the rate of conversion of the hydrocarbons to hydrogen is decreased less than approximately 1 percent during the reforming of the gas stream compared to the rate of deactivation of the catalyst metal when not treated with the total sulfur dose.

8. The method of claim 1, wherein periodically treating the catalyst metal comprises re-treating the catalyst metal with the total sulfur dose in the reducing gas mixture environment when there is an increase in a rate of deactivation of the treated metal catalyst.

9. The method of claim 1, wherein the total sulfur dose per treatment is from about 100 parts per billion hour (ppb-h) to about 5000 ppb-h.

10. The method of claim 1, wherein the gas stream comprises a natural gas stream, wherein the natural gas stream fed to the reactor during each periodic treatment includes the at least one sulfur-containing compound for treating the catalyst metal with the total sulfur dose.

11. The method of claim 1, wherein the catalyst metal comprises one or more of Ni, Co, Rh, Ru, Pd, Pt and Co.

12. A system comprising:

a reformer reactor, wherein the reformer reactor receives a gas stream including hydrocarbons and reform the gas stream using a treated catalyst metal to convert at least a portion of the hydrocarbons to hydrogen in the gas stream;

the treated catalyst metal within the reformer reactor, wherein the reformer reactor periodically treats the catalyst metal with a total sulfur dose per treatment in a reducing gas mixture environment within the reformer reactor by periodically adding a sulfur-containing compound to the reactor with the gas stream, wherein the reducing gas mixture comprises hydrogen and the at least one sulfur-containing compound, wherein the at least one sulfur-containing compound includes one or more of a hydrogen sulfide, a carbonyl sulfide, a carbonyl disulfide or an organic sulfur-containing compound, wherein the total sulfur dose per treatment is defined by a sulfur level in the reducing gas mixture and exposure time of the catalyst metal to the reducing gas mixture during the treatment, wherein the total sulfur dose per treatment is such that there is a decrease in a rate of deactivation of the catalyst metal during the reforming of the gas stream compared to the rate of deactivation of the catalyst metal not treated with the total sulfur dose, and wherein a concentration of sulfur in the reducing gas mixture during each treatment is between approximately 5 parts per billion volume (ppb-v) and approximately 200 ppb-v; and

a solid oxide fuel cell stack including a fuel side and an oxidant side, wherein solid oxide fuel cell stack receives the reformed gas stream at the fuel side as a fuel

source to generate electricity via an electrochemical reaction using the reformed gas stream as a fuel source.

13. The system of claim 12, wherein, during treatment, the reformer reactor is configured to heat the catalyst metal to a temperature between approximately 350 to 1,200 degrees Celsius in the reducing gas mixture environment.

14. The system of claim 13, wherein the reformer is configured to reform the gas stream including the hydrocarbons using the treated catalyst metal via steam reforming.

15. The system of claim 12, wherein the total sulfur dose is such that the rate of conversion of the hydrocarbons to hydrogen is decreased less than approximately 1 percent during the reforming of the gas stream compared to the rate of deactivation of the catalyst metal when not treated with the total sulfur dose.

16. The system of claim 12, wherein the decrease in the rate of deactivation of the catalyst metal is at least 30 percent compared to the rate of deactivation of the catalyst metal not treated with the total sulfur dose.

17. The system of claim 12, wherein the total sulfur dose per treatment is from about 100 parts per billion hour (ppb-h) to about 5000 ppb-h.

18. The system of claim 12, wherein the catalyst metal comprises one or more of Ni, Co, Rh, Ru, Pd, Pt and Co.