What is claimed is:

1. A sulfoxidation method comprising:

providing a hydrocarbon stream including at least one sulfur compound;

providing an oxidant;

providing a catalyst comprising a metal compound represented by the general formula $M_mO_m(OR)_n$, wherein M is a metal ~~complex~~; R is carbon group having at least 3 carbon atoms, where at each occurrence R is individually a substituted alkyl group containing at least one OH group, a substituted cycloalkyl group containing at least one OH group, a substituted cycloalkylalkyl group containing at least one OH group, a substituted heterocyclyl group containing at least one OH group, or a heterocyclylalkyl containing at least one OH group; and the subscripts m and n are each independently integers between ~~about~~ 1 and ~~about~~ 8; and

contacting the hydrocarbon stream with the oxidant in the presence of the catalyst, resulting in the oxidation of the at least one sulfur compound.

2. The method of claim **1** further comprising:

providing a phase transfer agent/solvent.

3. The method of claim **2** wherein the phase transfer agent/solvent is selected from the group consisting of acetic acid, formic acid, propanoic acid, octenoic acid, butenoic acid, long chain aliphatic acids, alkyl substituted aromatic acids, other polar protic liquids, and mixtures thereof.

4. The method of claim **1** wherein the catalyst comprises:

bis(polyol)oxotitanium(IV).

5. The method of claim **4** wherein the polyol further comprises:

ethylene glycol, glycerol, erythritol, sorbitol, xylitol, pentaerythritol, a sugar, a carbohydrate, and/or mixtures thereof.

6. The method of claim **1** wherein the method is carried out between 20 degrees Celsius and 90 degrees Celsius.

7. The method of claim **1** wherein the concentration of the catalyst is between 100.00% and 0.00004% by weight with respect to elemental sulfur.

8. The method of claim **1** wherein the catalyst is at least one of incorporated within a polymer and bound to a support surface, wherein the support surface comprises an organic polymer, an inorganic oxide, or mixtures thereof.

9. The method of claim **8** wherein the inorganic oxide is selected from the group consisting of:

silicates, aluminates, titanates, independently and/or mixtures thereof, and

wherein the organic polymer is selected from the group consisting of: polystyrene-co-divinylbenzene, containing reactive chemical functionalities comprising, isocyanates, anhydrides, sulfonyl halides, benzyl halides, carboxylic acid halides, phosphoryl acid halides, silyl chlorides, or any chemical functionality capable of reacting with the —OH pendant group of the catalyst.

10. The method of claim **1** wherein the catalyst is a solid in a form selected from the group consisting of a polymer, a complex, a cluster complex, a mixture of isomers, a nanodimensional material, and mixtures thereof;

wherein the hydrocarbon stream including at least one sulfur compound is selected from a group consisting of gasoline, diesel fuel, jet oil, heavy oil, heavy sour crude oil, other refinery products and intermediates, and mixtures thereof, and

wherein the oxidant is selected from the group consisting of hydrogen peroxide, sodium hypochlorite, oxygen, trioxygen, air, permanganate compounds, nitrous oxide, and mixtures thereof and different forms thereof.