

WHAT IS CLAIMED IS:

1. A paraffin dehydrogenation and metathesis catalyst system comprising:
a dehydrogenation catalyst comprising a stannosilicate, and
a metathesis catalyst comprising one or more olefin metathesis active metals selected from the group consisting of metals in Group 6 and Group 7 of the periodic table, wherein said one or more olefin metathesis active metals are supported on an olefin metathesis solid support.
2. The system of claim 1, wherein the stannosilicate comprises tin being incorporated into a silicate or aluminosilicate framework.
3. The system of claim 1 or claim 2, wherein tin is present in the dehydrogenation catalyst in an amount from about 3 wt-% to about 15 wt-%.
4. The system of claim 3, wherein the dehydrogenation catalyst further comprises one or more additional metals selected from the group consisting of In, Pb, Ge, Ga, Tl, Cu, Ag, Au, and mixtures thereof, being present in an amount, or combined amount, from about 0.1 wt-% to about 6 wt-%.
5. The system of any one of claims 1 to 4, wherein the one or more olefin metathesis active metals are selected from the group consisting of W, Mo, and Re.
6. The system of any one of claims 1 to 5, wherein the dehydrogenation catalyst and the metathesis catalyst are physically mixed in a catalyst bed.
7. The system of claim 6, further comprising a second catalyst bed comprising substantially all of the metathesis catalyst.
8. The system of any one of claims 1 to 5, wherein the dehydrogenation catalyst and the metathesis catalyst are in separate catalyst beds.
9. The system of claim 8, comprising three or more of said separate catalyst beds, alternately comprising said dehydrogenation catalyst and the metathesis catalyst.

10. A paraffin dehydrogenation and metathesis catalyst comprising:
- one or more dehydrogenation active metals selected from the group consisting of metals in Group 11, Group 13, and Group 14 of the periodic table, wherein said one or more dehydrogenation active metals are present in a dehydrogenation and metathesis solid support, and
 - one or more olefin metathesis active metals supported on said dehydrogenation and metathesis catalyst support and selected from the group consisting of metals in Group 6 and Group 7 of the periodic table.
11. The paraffin dehydrogenation and metathesis catalyst of claim 10, wherein said one or more olefin metathesis active metals is present in the catalyst in an amount, or combined amount, from about 0.05 wt-% to about 15 wt-%.
12. The paraffin dehydrogenation and metathesis catalyst of claim 10 or claim 11, wherein at least a portion of said one or more dehydrogenation active metals are dispersed on said dehydrogenation and metathesis solid support.
13. The paraffin dehydrogenation and metathesis catalyst of claim 10 or claim 11, wherein at least a portion of said one or more dehydrogenation active metals is chemically incorporated into said dehydrogenation and metathesis solid support.
14. The paraffin dehydrogenation and metathesis catalyst of claim 13, wherein said one or more dehydrogenation active metals includes tin and said dehydrogenation and metathesis catalyst support comprises a stannosilicate, wherein at least a portion of said tin is incorporated into a silicate framework of said stannosilicate.
15. The paraffin dehydrogenation and metathesis catalyst of claim 14, wherein tin is present in the catalyst in an amount from about 0.02 wt-% to about 30 wt-%.
16. A paraffin dehydrogenation and metathesis catalyst system comprising at least one catalyst bed comprising a physical mixture of:
- a dehydrogenation catalyst comprising one or more dehydrogenation active metals selected from the group consisting of metals in Group 11, Group 13, and Group 14 of

the periodic table, wherein said one or more dehydrogenation active metals are supported on a dehydrogenation solid support, and

a metathesis catalyst comprising one or more olefin metathesis active metals selected from the group consisting of metals in Group 6 and Group 7 of the periodic table, wherein said one or more olefin metathesis active metals are supported on an olefin metathesis solid support.

17. The catalyst system of claim 16, wherein a combined amount of metals in Groups 8-10 of the periodic table is less than about 0.1 wt-% in the dehydrogenation catalyst.
18. The catalyst system of claim 16 or claim 17, wherein the dehydrogenation solid support comprises a stannosilicate, having tin incorporated into a silicate framework.
19. The catalyst system of claim 16 or claim 17, wherein the dehydrogenation solid support comprises a dehydrogenation support metal oxide, a dehydrogenation support zeolite, or a combination thereof.
20. The catalyst system of claim 19, wherein the dehydrogenation support metal oxide is selected from the group consisting of alumina, silica, zirconia, titania, magnesia, calcium oxide, and mixtures thereof.
21. The catalyst system of claim 19, wherein the dehydrogenation support metal oxide is an oxide of a first metal selected from the group consisting of Li, Mg, Zn, Fe, Ca, Ni, Co, Mn, and Cu, and wherein the dehydrogenation solid support comprises a further dehydrogenation support metal oxide of a second metal selected from the group consisting of Al, Ga, Y, In, Fe, Co, Ni, Mn, Cr, Ti, V, Zr, and La.
22. A dehydrogenation and metathesis process, the process comprising contacting a feed comprising a non-cyclic paraffinic hydrocarbon with a dehydrogenation and metathesis catalyst system comprising at least:
a dehydrogenation catalyst comprising a stannosilicate.
23. The process of claim 22, wherein at least a portion of the tin is incorporated into a silicate or aluminosilicate framework.

24. A dehydrogenation and metathesis process, the process comprising contacting a feed comprising a paraffinic hydrocarbon, in the absence of an oxidizing agent with a dehydrogenation and metathesis catalyst system comprising at least:
a dehydrogenation catalyst comprising a stannosilicate.
25. The process of claim 24, wherein at least a portion of the tin is incorporated into a silicate or aluminosilicate framework.
26. The process of claim 24 or claim 25, wherein said paraffinic hydrocarbon is a C₂-C₁₂ paraffinic hydrocarbon.
27. The process of claim 26, wherein said paraffinic hydrocarbon is propane.
28. A dehydrogenation and metathesis process, the process comprising contacting a feed comprising a paraffinic hydrocarbon with the dehydrogenation and metathesis catalyst system of claim 16.
29. The process of any one of claims 22 to 28, wherein the feed comprises LPG or naphtha.
30. The process of any one of claims 22 to 29, wherein the dehydrogenation and metathesis catalyst system is a fixed bed catalyst system or a moving bed catalyst system.
31. The process of any one of claims 22 to 30, wherein the feed further comprises a sulfur-bearing compound to provide a total sulfur concentration in the feed from about 5 vol-ppm to about 500 vol-ppm.
32. The process of claim 31, wherein the sulfur-bearing compound is H₂S.
33. The process of claim 32, wherein the H₂S is generated from an organic sulfide precursor.
34. The process of any one of claims 22 to 33, wherein tin is present in the dehydrogenation catalyst in an amount of at least about 3% by weight.

35. The process of any one of claims 22 to 34, wherein a combined amount of metals in Groups 8-10 of the periodic table is less than about 0.01 wt-% in the dehydrogenation catalyst.
36. The process of any one of claims 22 to 35, wherein a combined amount of metals in Groups 1 and 2 of the periodic table is less than about 0.01 wt-% in the dehydrogenation catalyst.