What is claimed is:

1. A calcined dehydrogenation catalyst comprising

a primary species P1 selected from the group consisting of Ga, In, Tl, Ge, Sn, and Pb and combinations thereof, present in the composition in an amount within the range of ~~about~~ 0.05 wt.% to ~~about~~ 20 wt.%, calculated as elemental metal on a calcined basis;

a primary species P2 selected from the lanthanides, present in the composition in an amount within the range of ~~about~~ 0.05 wt.% to ~~about~~ 10 wt.%, calculated as elemental metal on a calcined basis;

a promoter M1 selected from the group consisting of Ni, Pd, and Pt, present in the composition in an amount within the range of ~~about~~ 10 ppm to ~~about~~ 500 ppm, calculated as elemental metal on a calcined basis;

a promoter M2 selected from the group consisting of Li, Na, K, Rb, Cs, Be, Mg, Ca, Sr, and Ba, present in the composition in an amount within the range of ~~about~~ 0.05 wt.% to ~~about~~ 3 wt.%, calculated as elemental metal on a calcined basis; and

a silica-alumina support S1, present in the composition in an amount within the range of ~~about~~ 60 wt.% to ~~about~~ 99 wt.%, calculated as oxide on a calcined basis, wherein the amount of silica present in S1 is within the range of 5 wt.% to 70 wt.%.

2. The catalyst composition of claim 1, wherein P1 is selected from Ga, Ge, In, Sn, and Tl and combinations thereof.

3. The catalyst composition of claim 1, wherein P1 is Ga.

4. The catalyst composition of claim 1, wherein P1 is present in the composition in an amount within the range of ~~about~~ 0.1 wt.% to ~~about~~ 10 wt.%, calculated as elemental metal on a calcined basis.
5. The catalyst composition of claim 1, wherein M1 is selected from Pd and Pt.

6. The catalyst composition of claim 1, wherein M1 is present in the composition in an amount within the range of ~~about~~ 50 ppm to ~~about~~ 400 ppm, calculated as elemental metal on a calcined weight basis.

7. The catalyst composition of claim 1, wherein M2 is selected from Li, Na, K, Cs, and Ba.

8. The catalyst composition of claim 1, wherein M2 is present in the composition in an amount within the range of ~~about~~ 0.05 wt.% to ~~about~~ 2 wt.%, calculated as elemental metal on a calcined basis.

9. The catalyst composition of claim 1, wherein

   P1 is Ga, present in the composition in an amount within the range of ~~about~~ 0.1 wt.% to ~~about~~ 10 wt.%, calculated as elemental metal on a calcined basis;

   P2 is Ce, present in the composition in an amount within the range of ~~about~~ 0.1 wt.% to ~~about~~ 6 wt.%, calculated as elemental metal on a calcined basis; and

   M1 is Pt, present in the composition in an amount within the range of ~~about~~ 50 ppm to ~~about~~ 400 ppm, calculated as elemental metal on a calcined weight basis.

10. A method for preparing a dehydrogenation catalyst composition according to claim 1, comprising

providing a silica-alumina support S1, optionally formulated with one or more of P1, P2, M1, and M2;

impregnating the silica-alumina support S1 with one or more of P1, P2, M1 and M2 in one or more impregnation steps, each impregnation step comprising contacting the support with an impregnation solution comprising one or more of a P1 source, a P2 source, an M1 source and an M2 source; and

calcining the impregnated silica-alumina support S1.

11. A method according to claim 10, wherein providing a silica-alumina support S1 comprises reacting an S1 source.

12. A method for preparing a dehydrogenation catalyst composition according to claim 1, comprising

providing a silica-alumina support S1 formulated with Ga;

impregnating the Ga-formulated silica-alumina support S1 with an impregnation solution comprising a P2 source, an M1 source and an M2 source, wherein if Ce is present in the dehydrogenation catalyst, the impregnation solution includes one or more of Ba and La; and

calcining the impregnated Ga-formulated silica-alumina support S1.

13. A method according to claim 12, wherein the P2 source is a salt, e.g., $Ce(NO_3)_3$ or $La(NO_3)_3$.

14. A method for dehydrogenating hydrocarbons, the method comprising contacting a hydrocarbon feed with the catalyst composition of claim 1.

15. A method according to claim 14, wherein the hydrocarbon feed comprises one or more $C_3$–$C_5$ alkanes.