CLAIMS

1. A hydrogenolysis catalyst comprising:

a catalytic component comprising copper oxide, manganese oxide, and aluminum oxide; and

a binder comprising a zirconium component,

wherein:

the catalyst comprises copper oxide in an amount from 45 wt% to 55 wt%,

the catalyst comprises less than 1.5 wt.% of silicon or an oxide thereof, based on the total weight of the hydrogenolysis catalyst, and

wherein the zirconium component is present in an amount from 4 wt% to 15 wt% by weight of the hydrogenolysis catalyst.

2. The hydrogenolysis catalyst of claims 1-4, wherein the manganese oxide is present in an amount from 5 wt% to 12 wt% by weight of the hydrogenolysis catalyst.

3. The hydrogenolysis catalyst of any one of claims 1or 2, wherein the aluminum oxide is present in an amount from 15 wt% to 40 wt% by weight of the hydrogenolysis catalyst.

4. The hydrogenolysis catalyst of any one of claims 1-3, wherein zirconium component is zirconium oxide.

5. The hydrogenolysis catalyst of claim 1, wherein the zirconium component is present in an amount from about 5 wt% to about 12 wt% by weight of the hydrogenolysis catalyst.

6. The hydrogenolysis catalyst of any one of claims 1-5, wherein the binder further comprises alumina.

7. The hydrogenolysis catalyst of any one of claims 1-6, wherein the hydrogenolysis catalyst further comprises an alkali metal component.

8. The hydrogenolysis catalyst of any one of claims 1-7, wherein the hydrogenolysis catalyst is in an unreduced form and exhibits an X-ray powder diffraction profile with 2θ peaks at

31.1°, 36.0°, 36.8°, 38.8°, 44.6°, 48.8°, 61.7°, 64.9°, 68.1° is in an unreduced form and exhibits an X-ray powder diffraction profile with 2θ peaks.

9. The hydrogenolysis catalyst of any one of claims 1-8, wherein the hydrogenolysis catalyst is a calcined and extruded hydrogenolysis catalyst.

10. The hydrogenolysis catalyst of any one of claims 1-9, wherein the hydrogenolysis catalyst exhibits a pore volume of greater than 0.25 cm^3/g, a packed bulk density of 0.8 g/cm^3 to 1.5 g/cm^3 a Brunauer-Emmett-Teller ("BET") surface area from 15 m^2/g to 70 m^2/g.

11. A method of preparing a calcined hydrogenolysis catalyst according to any of the claims 1 to 10, the method comprising:

mixing a catalytic component with a binder system and water to obtain a material mixture;

forming the material mixture to obtain a formed material mixture;

calcining the formed material mixture at a temperature, and for a time, sufficient to cure form the calcined hydrogenolysis catalyst;

wherein:

the catalytic component comprises copper oxide, manganese oxide, and aluminum oxide;

the binder system comprises a zirconium component;

the calcined hydrogenolysis catalyst comprises copper oxide in an amount from 45 wt% to 55 wt%;

the calcined hydrogenolysis catalyst comprises less than 1.5 wt.% of silicon or an oxide thereof, based on the total weight of the hydrogenolysis catalyst, and

wherein the zirconium component is present in an amount from 4 wt% to 15 wt% by weight of the hydrogenolysis catalyst.

12. The method of claim 11, wherein the catalytic component comprises pre-calcined powder comprising copper oxide, manganese oxide, and aluminum oxide.

13. The method of claim 12, wherein the pre-calcined powder was calcined at a temperature from 400°C to 800°C.

14. A method of conducting hydrogenolysis of a fatty acid ester, the method comprising contacting the fatty acid ester with a hydrogenolysis catalyst according to any of the claims 1-10.

15. The method of claim 14, wherein the fatty acid ester is represented by Formula I:

$$R^1\text{-}CO\text{-}OR^2 \text{ (I)},$$

wherein

R^1 and R^2 are each independently a branched or unbranched C_1 to C_{24} alkyl or a branched or unbranched C_2 to C_{24} alkenyl.