CLAIMS

1. A methane oxidation catalyst comprising one or more noble metals supported on non-modified zirconia, wherein the zirconia comprises tetragonal zirconia and monoclinic zirconia, and wherein the weight ratio of tetragonal zirconia to monoclinic zirconia is in the range of from 1:1 to 31:1.

2. The methane oxidation catalyst according to claim 1, wherein the zirconia comprising tetragonal zirconia and monoclinic zirconia was prepared by one or more thermal treatment steps of a single zirconia precursor.

3. The methane oxidation catalyst according to claim 2 wherein the thermal treatment step comprises calcination at a temperature in the range of from 675 to 1050 °C.

4. The methane oxidation catalyst according to claim 2 wherein the thermal treatment step comprises calcination at a temperature in the range of from 800 to 1025 °C.

5. The methane oxidation catalyst according to any one of claims 2 to 4, wherein the single zirconia precursor comprises tetragonal zirconia.

6. The methane oxidation catalyst according to claim 1 or 2, wherein the monoclinic zirconia is present as a dispersion of monoclinic zirconia in the tetragonal zirconia.

7. The methane oxidation catalyst according to any one of the preceding claims, wherein the non-modified zirconia is not sulfated and not tungsten-modified.

8. The methane oxidation catalyst according to any one of the preceding claims, wherein the methane oxidation catalyst is deposited on a ceramic or metallic monolith substrate comprising pore channels, defining an inner pore channel surface, and wherein the methane oxidation catalyst is deposited in the form of a coating, washcoat or a film of a thickness in the range of from 10 to 250 μm on the inner pore channel surface.

9. The methane oxidation catalyst according to any one of the preceding claims, wherein the catalyst comprises in the range of from 0.5 to 15 wt% of total noble metals, based on the total weight of the noble metal(s) and tetragonal and monoclinic zirconia.

10. The methane oxidation catalyst according to any one of the preceding claims, wherein the noble metals are selected from the group consisting of palladium, platinum and rhodium.

11. A process for preparing a methane oxidation catalyst comprising the following steps:

a.) calcining a zirconia precursor at a temperature of in the range of from 675 to 1050 °C to prepare non-modified zirconia comprising tetragonal zirconia and monoclinic zirconia wherein the weight ratio of tetragonal zirconia to monoclinic zirconia is in the range of from 1:1 to 31:1;

b.) impregnating the obtained zirconia with a noble metal precursor-comprising impregnation solution;

c.) drying the wet noble metal-impregnated zirconia at a temperature of no more than 120°C; and

d.) calcining the dried noble metal-impregnated zirconia at a temperature of in the range of from 400 to 650 °C.

12. The process according to claim 11, wherein the methane oxidation catalyst is a catalyst according to any one of claims 1 to 6.

13. The process according to claim 11 or 12, further comprising depositing the noble metal-impregnated zirconia after calcination in step (d) in the form of a layer, film or coating on a ceramic or metallic monolith substrate.

14. The process according to claim 11 or 12, further comprising depositing the zirconia obtained in step (a) in the form of a layer, film or coating on a ceramic or metallic monolith substrate and subsequently impregnating and treating the deposited zirconia according to steps (b) to (d).

15. The process according to claim 13 or 14, wherein the impregnated zirconia obtained in step (d) or the zirconia obtained in step (a) is deposited on the ceramic or metallic monolith by a washcoating step.

16. The process according to any one of claims 11 to 15, wherein the impregnation solution comprises a noble metal precursor selected from the group consisting of palladium compounds, platinum compounds and rhodium compounds.

17. The process according to any one of claims 11 to 16, wherein the impregnation solution comprises at least one or more noble metal complexing or chelating compounds in a molar ratio of the complexing or chelating compounds to noble metal of from 1:1 to 5:1.

18. A method of oxidizing methane by contacting a gas stream comprising methane with a methane oxidation catalyst according to any one of claims 1 to 10 in the presence of oxygen and oxidizing at least part of the methane in the gas stream to carbon dioxide and water.

19. The method according to claim 18, wherein the stream comprising methane is an exhaust gas from a natural gas-fueled engine.