alcoholic solution at a rate of about 1 to about 100 micromol/second, so as to form composites comprising the hydroxide of the metal at least partially, optionally completely, coated with silica, and stirring the suspension following addition of the alkoxysilane for at least about 10 hours;

e) Calcining the composites obtained in step d) for about 1 to about 5 hours at a temperature of about 400 to about 700°C so as to produce the composite substance; and

f) exposing the oxide of the metal to hydrogen or to one or more other reducing agents so as to reduce the oxide of the metal within the porous silica matrix so as to form particles of the metal within the porous silica matrix.

[00026] In a further embodiment, there is provided a process for preparing a composite substance comprising particles of an oxide of a metal dispersed in a porous silica matrix, wherein the metal is Cu, Ni, Cr, V, Co, Mn, Zn or Fe, said process comprising:

a) Preparing an aqueous solution comprising a soluble salt of the metal and a cetyltrimethylammonium salt;

b) Adding to the solution from step a) a sodium hydroxide solution so as to precipitate a hydroxide of the metal from the solution;

b') Separating the precipitated hydroxide of the metal from the solution;

c) Resuspending the hydroxide of the metal in an aqueous liquid and adjusting the resulting suspension to a pH greater than 7, optionally greater than about 10;

d) Adding to the suspension, with stirring, an alcoholic solution of tetraalkoxysilane, wherein the molar ratio of the tetraalkoxysilane to the metal hydroxide is between about 1:8 and about 8:1 and the alcoholic solution is added at a rate of about 1 to about 100 micromol/second, so as to form particles comprising the hydroxide of the metal at least partially coated with silica;

d') Separating the particles formed in step d) from the suspension and washing said particles with water; and

e) Calcining the particles obtained in step d) at about 500°C for about 1 to about 5 hours so as to produce the composite substance.

[00027] ~~According to a second aspect~~In an embodiment of the present disclosure, there is provided a composite substance prepared by the process as defined above.

[00028] According to a~~nother third~~ aspect of the present disclosure, there is provided a composite substance comprising particles of a metal or an oxide of the metal dispersed in a porous silica matrix, wherein each particle of said composite substance comprises a plurality of particles of the metal or the oxide of the metal dispersed therein, said composite substance being in particulate form, wherein particles of said substance have an aspect ratio of at least about 10. There

c) resuspending the hydroxide of the metal in an aqueous liquid and adjusting the resulting suspension to a pH greater than 7;

d) adding to the suspension, with stirring, an alcoholic solution of tetraalkoxysilane, so as to form particles comprising the hydroxide of the metal at least partially coated with silica;

d') separating the particles formed in step d) from the suspension and washing said particles with water; and

e) calcining the particles obtained in step d) at about 500°C for about 1 to about 5 hours so as to produce the composite substance.

~~30. A composite substance prepared by the process of any one of claims 1 to 29.~~

~~31~~30. A composite substance comprising particles of a metal or an oxide of the metal dispersed in a porous silica matrix, wherein each particle of said composite substance comprises a plurality of particles of the metal or the oxide of the metal dispersed therein, said composite substance being in particulate form, wherein particles of said substance have an aspect ratio of at least about 10.

~~32~~31. The composite substance of claim 30 ~~or claim 31~~ wherein the metal is a transition metal.

~~33~~32. The composite substance of claim 30 ~~or claim 31~~ wherein the metal is selected from the group consisting of Mg, Ca, Sr, Ba, Sc, Y, Ti, Zr, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Ga, In, Tl, Sn, Pb, Sb, Bi, La, Ce, Gd.

~~34~~33. The composite substance of any one of claims 30 to ~~33~~ 32 wherein the porous silica matrix has pores of about 1 to about 5 nm diameter.

~~35~~34. The composite substance of claim ~~34~~ 33 wherein the porous silica matrix additionally has pores of about 10 to about 100 nm diameter.

~~36~~35. The composite substance of any one of claims 30 to ~~35~~ 34 wherein the particles of the metal or of the oxide of the metal have a mean particle diameter of about 2 to about 10nm.

~~37~~36. The composite substance of any one of claims 30 to ~~36~~ 35 wherein the particles of the metal or of the oxide of the metal are substantially monodispersed in particle size.

~~38. The composite substance of any one of claims 30 to 37 which is in particulate form.~~

~~39. The composite substance of claim 38 wherein particles of said substance have an aspect ratio of at least about 10.~~

4037. The composite substance of ~~claim 38 or claim 39~~any one of claims 30 to 36 wherein the oxide of the metal is copper oxide and the composite substance is in the form of rod-like structures.

4138. The composite substance of claim ~~40~~ 37 wherein the rod-like structures have a diameter of about 10 to about 100 nm.

4239. The composite substance of ~~claim 38 or claim 39~~any one of claims 30 to 36 wherein the oxide of the metal is nickel oxide or iron oxide and wherein the substance has a sheet like structure, whereby~~, if particles of the substance have an aspect ratio of at least about 10,~~ the aspect ratio refers to a ratio of length to thickness of sheets of the sheet like structure.

4340. The composite substance of any one of claims ~~31–42~~30 to 39 wherein, on average, each particle of said composite substance comprises at least about 100 particles of the oxide of the metal dispersed therein.

4441. The composite substance of any one of claims 30 to ~~43~~ 40 having a BET surface area of at least about 200 m^2/g.

~~45.~~42 The composite substance of any one of claims 30 to ~~44~~ 41 wherein pores extend continuously from an outside surface of the silica matrix to an outside surface of the metal or oxide of the metal so as to allow a reactant to penetrate to the surface of the oxide of the metal.

4643. Use of the composite substance of any one of claims 30 to ~~45~~ 42 in an application selected from the group consisting of methanol synthesis and reforming, steam and CO_2 reforming of methane, Fischer–Tropsch synthesis, CO oxidation, catalytic biomass tar decomposition, SO_2 oxidation, NO reduction, methane oxidation and chemical looping combustion

4744. A process for oxidising a fuel comprising exposing said fuel to a composite substance according to any one of claims 30 to ~~45~~ 42 at sufficient temperature for combustion of the fuel.

4845. The process of claim ~~47~~ 44 wherein the sufficient temperature is at least about 500°C.

4946. The process of claim ~~48~~ 44 or claim ~~48~~ 45 wherein the metal is copper.

5047. The process of any one of claims ~~47~~ 44 to ~~49~~ 46 wherein said process is chemical looping combustion.