CLAIMS

1. A hierarchically ordered crystalline microporous material having long-range mesoporous ordering of lamellar symmetry comprising mesopores having walls of crystalline microporous material and a mass of mesostructure between mesopores of crystalline microporous material, whereby the long-range ordering of lamellar mesophase symmetry is defined by the presence of secondary peaks at 2θ angle less than 6º in an X-ray diffraction (XRD) pattern and is observable by microscopy including mesopore periodicity repeating over a length of greater than 50 nm.

2. A hierarchically ordered crystalline microporous material having well-defined long-range mesoporous ordering of lamellar symmetry comprising mesopores having walls of crystalline microporous material and a mass of mesostructure between mesopores of crystalline microporous material, in which at least a portion of the mesopores contain micelles of supramolecular templates shaped to induce mesoporous ordering of lamellar symmetry, and in which the supramolecular templates possess one or more dimensions larger than dimensions of micropores of the crystalline microporous material to constrain diffusion into micropores of the crystalline microporous material, in which the dimensions relate to a head group of a supramolecular template, a tail group of a supramolecular template, or a co-template arrangement that constrain diffusion into micropores of the crystalline microporous material , and in which if the crystalline microporous material possesses micropores of various dimensions, the one or more dimensions of the supramolecular templates are larger than the largest micropores of the crystalline microporous material.

3. A hierarchically ordered crystalline microporous material according to Claim 2, further comprising an ionic co-solute.

4. A hierarchically ordered crystalline microporous material according to Claim 3, in which the ionic co-solute comprises ClO_4^-.

5. A hierarchically ordered crystalline microporous material according to any preceding claim, in which the lamellar mesophase possesses p2 or p1 or pm symmetry.

6. A hierarchically ordered crystalline microporous material according to Claims 1 to 4, in which the lamellar mesophase possesses p2 symmetry and secondary peaks in XRD are present at a (200) reflection.

7. A hierarchically ordered crystalline microporous material according to Claims 1 to 4, in which long-range ordering is observable by microscopy viewing an electron beam parallel or perpendicular to a [100] zone axis.

8. A hierarchically ordered crystalline microporous material according to any preceding claim, in which the crystalline microporous material comprises a zeolite or zeolite-type material selected from the group consisting of aluminophosphates, silicon-substituted aluminophosphates, metal-containing aluminophosphates and zeolitic siliceous only framework material.

9. A hierarchically ordered crystalline microporous material according to any of Claims 1 to 7, in which the crystalline microporous material is a zeolite having a framework selected from the group consisting of AEI, *BEA, CHA, FAU, MFI, MOR, LTL, LTA and MWW.

10. A hierarchically ordered crystalline microporous material according to any of Claims 1 to 7, in which the crystalline microporous material is a zeolite having FAU framework.

11. A hydrocracking catalyst comprising the hierarchically ordered crystalline microporous material according to any of Claims 8, 9 or 10, an inorganic oxide component as a binder, and an active metal component comprising one or more metals selected from the Periodic Table of the Elements IUPAC Groups 6, 7, 8, 9 or 10.

12. A hydrocracking catalyst according to Claim 11, in which the hierarchically ordered crystalline microporous material comprises 0.1-99, 0.1-90, 0.1-80, 0.1-70, 0.1-50, 0.1-40, 2-99, 2-90, 2-80, 2-70, 2-50, 2-40, 20-100, 20-90, 20-80, 20-70, 20-50, or 20-40 wt% of the hydrocracking catalyst.

13. A hydrocracking catalyst according to Claim 11 or 12, in which the inorganic oxide component is selected from the group consisting of alumina, silica, titania, silica-alumina, alumina-titania, alumina-zirconia, alumina-boria, phosphorus-alumina, silica-alumina-boria, phosphorus-alumina-boria, phosphorus-alumina-silica, silica-alumina-titania, silica-alumina-zirconia, alumina-zirconia-titania, phosphorous-alumina-zirconia, alumina-zirconia-titania and phosphorus-alumina-titania.

14. A hydrocracking catalyst according to Claim 11 or 12, in which the inorganic oxide component comprises alumina.

15. A hydrocracking catalyst according to Claim 14, in which the crystalline microporous material comprises FAU zeolite.

16. A hydrocracking catalyst according to Claim 15, in which the active metal component comprises one or more of Mo, W, Co or Ni (oxides or sulfides).