## Claims

1. A catalyst for light olefins production from catalytic cracking of hydrocarbon having 4 to 7 carbon atoms, wherein said catalyst has core-shell structure comprising zeolite core selected from ferrierite, ZSM-5, or mixture thereof, and silicalite shell having MFI structure, and said catalyst has the following characteristics:

a) the weight ratio of shell to core greater than 0 but less than 4;

b) the mole ratio of silica to alumina **(**$SiO_2/Al_2O_3$**)** from 60 to 550;

c) the hierarchical pores comprising micropores having pore size in the range of 0.1 to 2 nm, mesopores having pore size in the range of 2 to 50 nm, and macropores having pore size greater than 50 nm, wherein the proportion of volume of mesopores and macropores to the total pore volume is in the range from 0.35 to 0.90, and said mesopores comprise pores having pore size from 2 to 5 nm, wherein the proportion of volume of pores having pore size from 2 to 5 nm to the total pore volume is in the range from 0.08 to 0.30.

2. The catalyst according to claim 1, wherein said mesopores comprise pores having pore size from 2 to 5 nm, wherein the proportion of volume of pores having pore size from 2 to 5 nm to the total pore volume is in the range from 0.10 to 0.20.

3. The catalyst according to any one of claims 1 or 2, wherein said mesopores further comprise pores having pore size from 5 to 8 nm and pores having pore size from 8 to 18 nm.

4. The catalyst according to claim 1, wherein said zeolite core has the hierarchical pores comprising micropores having pore size in the range of 0.1 to 2 nm, mesopores having pore size in the range of 2 to 50 nm, and macropores having pore size greater than 50 nm, wherein the proportion of volume of mesopores and macropores to the total pore volume is in the range from 0.30 to 0.90.

5. The catalyst according to any one of claims 1 or 4, wherein said zeolite core has the hierarchical pores and is arranged in nano-sheet.

6. The catalyst according to claim 1, wherein said silicalite shell has the hierarchical pores and is arranged in nano-sheet.

7. The catalyst according to claim 1, wherein said zeolite core has the mole ratio of silica to alumina in the range from 35 to 320.

8. The catalyst according to claim 1, wherein said zeolite core is the ferrierite having the flower-shaped particle arrangement when analyzed by the scanning electron microscope (SEM) technique at the accelerating voltage of 20 kV with SEI mode.

9. The catalyst according to claim 1, wherein said catalyst has the mole ratio of silica to alumina in the range from 100 to 400.

10. The catalyst according to claim 1, wherein said catalyst comprises the ZSM-5 core having the mole ratio of silica to alumina in the range from 120 but no more than 300 and the silicalite shell, and said catalyst has the weight ratio of shell to core greater than 0 but less than or equal to 1.5.

11. The catalyst according to claim 1, wherein said catalyst comprises the ZSM-5 core having the mole ratio of silica to alumina in the range from 50 but no more than 120 and the silicalite shell, and said catalyst has the weight ratio of shell to core greater than 0 but less than or equal to 3.

12. The catalyst according to claim 1, wherein said catalyst comprises the ferrierite core having the mole ratio of silica to alumina in the range from 150 but no more than 300 and the silicalite shell, and said catalyst has the weight ratio of shell to core greater than 0 but less than or equal to 2.

13. The catalyst according to claim 1, wherein said catalyst comprises the ferrierite core having the mole ratio of silica to alumina in the range from 50 but no more than 150 and the silicalite shell, and said catalyst has the weight ratio of shell to core greater than 0 but less than or equal to 2.

14. The catalyst according to claim 1, wherein said catalyst further comprises manganese (Mn).

15. The catalyst according to claim 14, wherein said catalyst further comprises manganese (Mn) in an amount of from 1 to 15 % by weight when comparing with the weight of zeolite core.

16. The catalyst according to claim 1, wherein said zeolite core further comprises manganese (Mn).

17. The catalyst according to claim 16, wherein said zeolite core further comprises manganese (Mn) in an amount of from 1 to 15 % by weight when comparing with the weight of zeolite core.

18. The catalyst according to claim 1, wherein said hydrocarbon is selected from butane, pentane, hexane, or heptane.

19. A process of light olefins production from catalytic cracking of hydrocarbon having 4 to 7 carbon atoms, comprising the contact of the hydrocarbon having 4 to 7 carbon atoms to the catalyst at the temperature in the range from 400 to 700 °C and the pressure in the range from 0.1 to 10 bars, wherein said catalyst has core-shell structure comprising zeolite core selected from ferrierite, ZSM-5, or mixture thereof, and silicalite shell having MFI structure, and said catalyst has the following characteristics:

a) the weight ratio of shell to core greater than 0 but less than 4;

b) the mole ratio of silica to alumina **(**$SiO_2/Al_2O_3$**)** from 60 to 550;

c) the hierarchical pores comprising micropores having pore size in the range of 0.1 to 2 nm, mesopores having pore size in the range of 2 to 50 nm, and macropores having pore size greater than 50 nm, wherein the proportion of volume of mesopores and macropores to the total pore volume is in the range from 0.35 to 0.90, and said mesopores comprise pores having pore size from 2 to 5 nm, wherein the proportion of volume of pores having pore size from 2 to 5 nm to the total pore volume is in the range from 0.08 to 0.30.

20. The process of light olefins production according to claim 19, wherein said mesopores comprise pores having pore size from 2 to 5 nm, wherein the proportion of volume of pores having pore size from 2 to 5 nm to the total pore volume is in the range from 0.10 to 0.20.

21. The process of light olefins production according to any one of claims 19 or 20, wherein said mesopores further comprise pores having pore size from 5 to 8 nm and pores having pore size from 8 to 18 nm.

22. The process of light olefins production according to claim 19, wherein said zeolite core has the hierarchical pores comprising micropores having pore size in the range of 0.1 to 2 nm, mesopores having pore size in the range of 2 to 50 nm, and macropores having pore size greater than 50 nm, wherein the proportion of volume of mesopores and macropores to the total pore volume is in the range from 0.30 to 0.90.

23. The process of light olefins production according to any one of claims 19 or 22, wherein said zeolite core has the hierarchical pores and is arranged in nano-sheet.

24. The process of light olefins production according to claim 19, wherein said silicalite shell has the hierarchical pores and is arranged in nano-sheet.

25. The process of light olefins production according to claim 19, wherein said zeolite core has the mole ratio of silica to alumina in the range from 35 to 320.

26. The process of light olefins production according to claim 19, wherein said zeolite core is the ferrierite having the flower-shaped particle arrangement when analyzed by the scanning electron microscope (SEM) technique at the accelerating voltage of 20 kV with SEI mode.

27. The process of light olefins production according to claim 19, wherein said catalyst has the mole ratio of silica to alumina in the range from 100 to 400.

28. The process of light olefins production according to claim 19, wherein said catalyst comprises the ZSM-5 core having the mole ratio of silica to alumina in the range from 120 but no more than 300 and the silicalite shell, and said catalyst has the weight ratio of shell to core greater than 0 but less than or equal to 1.5.

29. The process of light olefins production according to claim 19, wherein said catalyst comprises the ZSM-5 core having the mole ratio of silica to alumina in the range from 50 but no more than 120 and the silicalite shell, and said catalyst has the weight ratio of shell to core greater than 0 but less than or equal to 3.

30. The process of light olefins production according to claim 19, wherein said catalyst comprises the ferrierite core having the mole ratio of silica to alumina in the range from 150 but no more than 300 and the silicalite shell, and said catalyst has the weight ratio of shell to core greater than 0 but less than or equal to 2.

31. The process of light olefins production according to claim 19, wherein said catalyst comprises the ferrierite core having the mole ratio of silica to alumina in the range from 50 but no more than 150 and the silicalite shell, and said catalyst has the weight ratio of shell to core greater than 0 but less than or equal to 2.

32. The process of light olefins production according to claim 19, wherein said catalyst further comprises manganese (Mn).

33. The process of light olefins production according to claim 32, wherein said catalyst further comprises manganese (Mn) in an amount of from 1 to 15 % by weight when comparing with the weight of zeolite core.

34. The process of light olefins production according to claim 19, wherein said zeolite core further comprises manganese (Mn).

35. The process of light olefins production according to claim 34, wherein said zeolite core further comprises manganese (Mn) in an amount of from 1 to 15 % by weight when comparing with the weight of zeolite core.

36. The process of light olefins production according to claim 19, wherein the contact of the hydrocarbon having 4 to 7 carbon atoms to the catalyst is performed at the temperature in the range from 500 to 700 °C.

37. The process of light olefins production according to claim 19, wherein said hydrocarbon is selected from butane, pentane, hexane, or heptane.