CLAIMS

1. A process of controlling the morphology of graphite in a process for the production of graphite, the process comprising:

    contacting at elevated temperature, a metal-containing catalyst with a hydrocarbon gas to catalytically convert at least a portion of the hydrocarbon gas to hydrogen and carbon;

    wherein the temperature is between 600 °C and 1000 °C and a pressure between 0 bar(g) and 100 bar(g), and wherein both the temperature and the pressure are set within predetermined value ranges to selectively synthesise graphitic material with a desired morphology selected from the group consisting of: carbon nano-onions (CNOs).

2. A process according to claim 1, wherein the metal-containing catalyst is a metal oxide catalyst.

3. A process according to claim 1 or claim 2, wherein the metal-containing catalyst is an iron oxide catalyst.

4. A process according to claim 3, wherein the iron oxide catalyst is selected from Fe_2O_3 and Fe_3O_4 or any mixture thereof.

5. A process according to claim 3, wherein the iron oxide catalyst is selected from hematite iron ore and goethite iron ore or any mixture thereof

6. A process according to any one of the preceding claims, wherein the metal-containing catalyst is unsupported.

7. A process according to any one of claims 1 to 5, wherein the metal-containing catalyst is supported on a support.

8. A process according to claim 7, wherein the support is of the same chemical composition as the metal-containing catalyst.

9. A process according to any one of the preceding claims, wherein the hydrocarbon gas is methane.

10. A process according to any one of claim 1 to 8, wherein the hydrocarbon gas is natural gas.

11. A method according to any one of the preceding claims, wherein the step of:

contacting at elevated temperatures a metal-containing catalyst with a hydrocarbon gas to catalytically convert at least a portion of the hydrocarbon gas to hydrogen and carbon,

is conducted at a temperature between 700 °C to 900 °C and a pressure between 0 bar(g) to 8 bar(g).

12. A method according to claim 11, the temperature is 800 °C to 900 °C and the pressure is 2 bar(g) to 4 bar(g).

13. Carbon nano-onions (CNOs) produced by the process of any one of claims 1 to 12.