CLAIMS

1. A method of producing a synthetic diamond, the method comprising:

(a) capturing carbon dioxide from the atmosphere;

(b) performing electrolysis of water to provide hydrogen and oxygen;

(c) reacting carbon dioxide obtained from step (a) with hydrogen obtained from step (b) to produce methane;

(d) using hydrogen obtained from step (b) and methane obtained from step (c) to produce a synthetic diamond by chemical vapour deposition (CVD);

(e) reacting oxygen produced from step (b) with carbon produced by the chemical vapour deposition in step (d) to produce carbon dioxide; and

(f) adding carbon dioxide produced in step (e) to carbon dioxide obtained from step (a) prior to step (c).

2. The method of claim 1, wherein the reaction of step (c) is carried out in the presence of a nickel-based catalyst or a ruthenium-based catalyst.

3. The method of claim 1 or claim 2, wherein the reaction of step (c) is performed using methanogens.

4. The method of claim 3, wherein the methanogens are prokaryotes.

5. The method of claim 4, wherein the prokaryotes are archaea.

6. The method of any of claims 1 to 5, further comprising reacting the carbon dioxide obtained from step (e) with the hydrogen obtained from step (b) to produce methane.

7. A method of producing a synthetic diamond, the method comprising:

(a) capturing carbon dioxide from the atmosphere;

(b) performing electrolysis of water to provide hydrogen and oxygen;

(c-1) electrochemically reacting carbon dioxide obtained from step (a) with water to produce methane;

(d) using hydrogen obtained from step (b) and methane obtained from step (c-1) to produce a synthetic diamond by chemical vapour deposition (CVD);

(e) reacting oxygen produced from step (b) with carbon produced by the chemical vapour deposition in step (d) to produce carbon dioxide; and

(f) adding carbon dioxide produced in step (e) to carbon dioxide obtained from step (a) prior to the repetition of step (c-1).

8. The method of claim 1 or claim 7, wherein step (a) comprises capturing carbon dioxide using a nanotube gas separator.

9. The method of claim 1 or claim 7, wherein step (a) comprises capturing carbon dioxide using an amine-containing sorbent-material.

10. The method of any of claims 7 to 9, wherein step (c-1) is conducted in the presence of a metal catalyst, preferably wherein the catalyst is a nickel-based catalyst.

11. The method of any of claims 7 to 10, wherein the CVD is carried out on a substrate comprising diamond.

12. The method of any of claims 7 to 11, further comprising reacting the carbon dioxide obtained from step (e).

13. The method of any preceding claim, wherein the method further comprises using energy from at least one renewable source to perform the electrolysis.

14. The method of any preceding claim, wherein the water used in step (b) and/or the water used in step (c-1) comprises rainwater.

15. The method of any preceding claim, wherein the method further comprises an additional step, after step (d), of annealing the synthetic diamond.