Claims

1. A method of fabricating a plurality of single crystal CVD diamonds, the method comprising:

coating a carrier substrate with a layer of polycrystalline CVD diamond material;

bonding a plurality of single crystal diamond substrates to the layer of polycrystalline CVD diamond material on the carrier substrate;

growing single crystal CVD diamond material on the plurality of single crystal diamond substrates to form a plurality of single crystal CVD diamonds; and

separating the plurality of single crystal CVD diamonds from the layer of polycrystalline CVD diamond material on the carrier substrate and any polycrystalline CVD diamond material which has grown between the plurality of single crystal CVD diamonds to yield a plurality of individual single crystal CVD diamonds.

2. A method according to claim 1, wherein a surface roughness of the carrier substrate and a thickness and texture of the layer of polycrystalline CVD diamond material grown thereon are selected and controlled to ensure that the layer of polycrystalline CVD diamond remains adhered to the carrier substrate on cool down after fabrication of the polycrystalline CVD diamond layer and also during single crystal CVD diamond growth after bonding of the plurality of single crystal diamond substrates to the layer of polycrystalline CVD diamond material on the carrier substrate.

3. A method according to claim 1 or 2, wherein the carrier substrate is made of a carbide forming material.

4. A method according to any preceding claim, wherein the carrier substrate has a diameter in a range 30 mm to 200 mm.

5. A method according to any preceding claim, wherein the carrier substrate has a thickness in a rang**e** 3 mm to 20 mm.

6. A method according to any preceding claim, wherein the carrier substrate has a surface roughness in a range 0.05 μm to 0.3 μm.

7. A method according to any preceding claim, wherein the carrier substrate has a surface flatness with a height variation of no more than 20 μm.

8. A method according to any preceding claim, wherein the layer of polycrystalline CVD diamond formed on the carrier substrate has a thickness in a range 20 μm to 200 μm.

9. A method according to any preceding claim, wherein the plurality of single crystal diamond substrates are bonded to the layer of polycrystalline CVD diamond material on the carrier substrate via brazing or soldering using a braze or solder.

10. A method according to claim 9, wherein the bonding between the single crystal diamond substrates and the layer of polycrystalline CVD diamond material is achieved by heating in a reducing atmosphere.

11. A method according to claim 10, wherein the heating is achieved by induction heating.

12. A method according to any preceding claim, wherein growth of the single crystal CVD diamond material on the plurality of single crystal diamond substrates is controlled such that a ratio of the single crystal CVD diamond growth rate to the polycrystalline CVD diamond growth rate is >0.5, >0.75, >1.0, >1.5, >1.75, or >2.

13. A method according to any preceding claim, wherein the plurality of individual single crystal CVD diamonds have a variation in α growth parameter of <1, <0.5, <0.3, <0.2, or <0.1.

14. A method according to any preceding claim, wherein the layer of polycrystalline CVD diamond material is grown at a temperature over 1000°C and the single crystal CVD diamonds are grown at a temperature under 1000°C.

15. A method according to any preceding claim, wherein the layer of polycrystalline CVD diamond material is removed from the carrier substrate prior to separating the plurality of single crystal CVD diamonds from the layer of polycrystalline CVD diamond material.