16. A CVD single crystal diamond material according to any one of the preceding claims which shows at least one of the following characteristics, when measured at room temperature (nominally 20°C):

i) a low and uniform optical scatter such that for a sample of a specified thickness of at least 0.4 mm the forward scatter at 1.064 µm, measured in a manner described herein over a specified area of at least 1.3 mm x 1.3 mm, integrated over a solid angle from 3.5° to 87.5° from the transmitted beam, is less than 0.4%;

ii) a low and uniform optical absorption such that a sample of a specified thickness of at least 0.5 mm has an optical absorption coefficient at a wavelength of 1.06 µm of less than 0.09 cm^{-1};

iii) a low and uniform optical absorption such that a sample of a specified thickness of at least 0.5 mm has an optical absorption coefficient at a wavelength of 10.6 µm of less than 0.04 cm^{-1}.

17. A CVD single crystal diamond material according to claim 16, wherein the forward scatter at a wavelength of 1.064 µm measured in sample of the specified thickness and area, integrated over a solid angle from 3.5° to 87.5° from the transmitted beam, is less than 0.2%.

18. A CVD single crystal diamond material according to claim 17, which exhibits a forward scatter at 1.064 µm of less than 0.1%.

19. A CVD single crystal diamond material according to any one of claims 16 to 18, wherein the optical absorption coefficient at 1.06 µm is less than 0.05 cm^{-1}.

20. A CVD single crystal diamond material according to claim 19, wherein the optical absorption coefficient at 1.06 μm is less than 0.02 cm^{-1}.

21. A CVD single crystal diamond material according to any one of claims 16 to 20, wherein the optical absorption coefficient at 10.6 μm is less than 0.03 cm^{-1}.

22. A CVD single crystal diamond material according to claim 21, wherein the optical absorption coefficient at 10.6 μm is less than 0.027 cm^{-1}.

23. A CVD single crystal diamond material according to any one of the preceding claims which shows at least one of the following characteristics, when measured at room temperature (nominally 20°C):

i) an ability to be processed to show a high surface polish with an R_a (arithmetic mean of the absolute deviation from the mean line through the profile) measured over a specified area of at least 1.3 mm x 1.3 mm less than 2 nm;

ii) an ability to be processed to show a high flatness, with a flatness measured using 633 nm radiation and measured over a specified area of at least 1.3 mm x 1.3 mm which is better than 10 fringes;

iii) an ability to be processed to show a high parallelism, with a parallelism measured over a specified area of at least 1.3 mm x 1.3 mm which is better than 1 arc minute.

24. A CVD single crystal diamond material according to claim 23, which can be processed to show a surface polish with an R_a less than 1 nm.

34. A CVD single crystal diamond material according to any one of claims 23 to 29, which shows all three of the given characteristics.

35. A CVD single crystal diamond material according to any one of the preceding claims, wherein the specified area of the sample in each of the satisfied characteristics, if given, is at least 2.5 x 2.5 mm.

36. A CVD single crystal diamond material according to claim 35, wherein the specified area of the sample in each of the satisfied characteristics, if given, is at least 4 x 4 mm.

37. A CVD single crystal diamond material according to any one of the preceding claims, wherein the specified thickness of the sample in each of the satisfied characteristics, if given, is at least 0.8 mm.

38. A CVD single crystal diamond material according to claim 37, wherein the specified thickness of the sample in each of the satisfied characteristics, if given, is at least 1.2 mm.

39. A CVD single crystal diamond material according to any one of the preceding claims which shows a mechanical design strength, measured in a manner described herein, such that at least 70% of samples tested over a batch size of at least 8 will only fail at strength values of at least 2.5 Gpa.

40. A CVD single crystal diamond material according to claim 39, wherein at least 70% of samples tested over a batch size of at least 8 will only fail at strength values of at least 3.0 GPa.

41. A CVD single crystal diamond material according to any one of the preceding claims, having a Raman normalised luminescence intensity of the 575 nm and 637 nm peaks which is less than 40.

59. A CVD single crystal diamond material according to any one of the preceding claims, which contains more than 3 x 10^{15} atoms/cm^3 N in single substitutional form as measured by EPR.

60. A CVD single crystal diamond material according to claim 59, which contains more than 1 x 10^{16} atoms/cm^3 N in single substitutional form as measured by EPR.

61. A CVD single crystal diamond material according to claim 60, which contains more than 5 x 10^{16} atoms/cm^3 N in single substitutional form as measured by EPR.

62. A method of producing a CVD diamond material suitable for optical applications and according to any one of the preceding claims, which method includes the steps of:

- providing a substrate substantially free of crystal defects,

- providing a source gas,

- dissociating the source gas to produce a synthesis atmosphere which contains 300 ppb to 5 ppm nitrogen, calculated as molecular nitrogen, and

- allowing homoepitaxial diamond growth on the surface which is substantially free of crystal defects

wherein the surface damage of the substrate is minimised by including a plasma etch on the surface on which homoepitaxial diamond growth is to occur, whereby a density of defects at the surface of the substrate is such that surface etch features related to the defects is below 5 x $10^3/mm^2$,

wherein the level of nitrogen is controlled with an error of less than 300

ppb (as a molecular fraction of the total gas volume) or 10% of the target value in the gas phase, whichever is the larger, and

wherein the level of nitrogen is selected to be sufficient to prevent or reduce local strain generating defects whilst being low enough to prevent or reduce deleterious absorptions and crystal quality degradation, thereby producing a CVD single crystal diamond material meeting the requirements of one or more of claims 1 to 61.

63. A method according to claim 62, wherein the synthesis atmosphere contains more than 500 ppb nitrogen, calculated as molecular nitrogen.

64. A method according to claim 63, wherein the synthesis atmosphere contains more than 800 ppb nitrogen, calculated as molecular nitrogen.

65. A method according to any one of claims 62 to 64, wherein the synthesis atmosphere contains no more than 2 ppm nitrogen, calculated as molecular nitrogen.

66. A method according to claim 65, wherein the synthesis atmosphere contains no more than 1.5 ppm nitrogen, calculated as molecular nitrogen.

~~67. A method according to claim 62, wherein the level of nitrogen is selected to be sufficient to prevent or reduce local strain generating defects whilst being low enough to prevent or reduce deleterious absorptions and crystal quality degradation.~~

~~68. A method according to any one of claims 62 to 67, wherein the density of defects is such that surface etch features related to defects is below 5 x 10^3/mm^2.~~

~~69.~~67. A method according to any one of claims 62 to 66~~-68~~, wherein the density of defects is such that surface etch features related to defects is below 10^2/mm^2.

~~70.~~68. A method according to any one of claims 62 to ~~69~~67, wherein the surface of the diamond substrate on which CVD diamond growth occurs is the {100} surface.

~~71. A method according to any one of claims 62 to 70, wherein the level of nitrogen is controlled with an error of less than 300 ppb (as a molecular fraction of the total gas volume) or 10% of the target value in the gas phase, whichever is the larger.~~

~~72.~~69. A method according to any one of claims 62 to 68~~-71~~, wherein the level of nitrogen is controlled with an error of less than 100 ppb (as a molecular fraction of the total gas volume) or 3% of the target value in the gas phase, whichever is the larger.

~~73.~~70. A method according to claim ~~72~~69, wherein the level of nitrogen is controlled with an error of less than 50 ppb (as a molecular fraction of the total gas volume) or 2% of the target value in the gas phase, whichever is the larger.

~~74.~~71. A method according to any one of claims 62 to ~~73~~70, wherein the properties of the CVD single crystal diamond material produced are further enhanced by annealing the diamond material.

~~75.~~72. A CVD single crystal diamond material produced by a method according to any one of claims 62 to ~~74~~71.

~~76.~~73. An etalon produced from a CVD single crystal diamond material according to any one of claims 1 to 61 and ~~75~~72.

~~77.~~74. An etalon according to claim ~~76~~73, which is a Fabry-Perot etalon or a Gires-Tournois etalon.

75. A CVD single crystal diamond material according to any one of claims 1 to 61 which meets the requirements of any one of claims 1 to 61 after growth, after suitable shape and surface processing, or after processing by annealing.

76. A CVD single crystal diamond material according to claim 75 which meets the requirements of any one of claims 1 to 61 after growth.

77. A CVD single crystal diamond material according to claim 75 which meets the requirements of any one of claims 1 to 61 after suitable shape and surface processing.

78. A CVD single crystal diamond material according to claim 75 which meets the requirements of any one of claims 1 to 61 after processing by annealing.