CLAIMS:

1. A chemical vapor deposition (CVD) method for preparing a layer comprising silicon carbide crystals, wherein at least part of the layer is formed from a gas mixture containing a silicon source and an aromatic carbon source, wherein the molar C/Si ratio in said gas mixture is from 0.85 to 1.45.

2. The chemical vapor deposition method of claim 1, wherein the aromatic carbon source is a C_6 to C_{30} aromatic compound.

3. The chemical vapor deposition method of claim 1 or claim 2, wherein the reaction temperature is from 900 to 1800°C.

4. The chemical vapor deposition method of any one of claims 1 to 3, wherein the reaction is carried out under reduced pressure; and/or
wherein the gas mixture further comprises an inert carrier gas such as H_2 or Ar.

5. The chemical vapor deposition method of any one of claims 1 to 4, wherein the method yields a free-standing layer or wherein the layer is deposited onto a carbonaceous substrate; or onto a siliconaceous substrate; or onto a layer comprising refractory metal carbides.

6. A layer comprising silicon carbide crystals, wherein in SEM image analysis of a cross section of the layer, at most 20% of the surface of the cross section area has a pattern of parallel lines tilted by more than 15° with respect to a portion of a surface of the layer which is closest to the respective image.

7. The layer of claim 6, wherein the surface of the layer comprises silicon carbide crystal tops having a regular hexagonal pyramid shape, and less than 10 % of the surface is occupied by large crystal tops having a regular hexagonal pyramid shape wherein a distance from one corner of a regular hexagonal base of the top to an opposite corner of the base is at least 25 μm;
and/or

wherein the layer is characterized by a Raman spectrum of the layer comprising two overlapping peaks, a first of these peaks having its maximum intensity in a range from 758 to 778 cm^{-1}, a second of these peaks having its maximum intensity in a range from 785 to 805 cm^{-1}, and a surface area ratio calculated by dividing a first surface area of the first peak by a second surface area of the second peak is at least 0.05.

8. The layer according to claim 7, wherein a fraction of at least 10 % of the surface is covered by the tops having the regular hexagonal pyramid shape.

9. A layer according to any one of claims 6 to 8, wherein a distribution of silicon carbide crystal orientations is such that an orientational quality Q is at least 0.90,
wherein the orientational quality Q is calculated from maximum peak intensities of an X-ray diffractogram detected with Cu k-alpha radiation at 1.5406 Å wavelength, according to the following formula

$$Q = \frac{I_{111} + I_{222} + I_{333/511}}{I_{111} + I_{200} + I_{220} + I_{311} + I_{222} + I_{400} + I_{331} + I_{420} + I_{333/511} + I_{422}}$$

wherein

I_{111} is the maximum intensity at 2θ ranging from 34.6° to 36.6°,
I_{200} is the maximum intensity at 2θ ranging from 40.4° to 42.4°,
I_{220} is the maximum intensity at 2θ ranging from 59.0° to 61.0°,
I_{311} is the maximum intensity at 2θ ranging from 70.8° to 72.8°,
I_{222} is the maximum intensity at 2θ ranging from 74.5° to 76.5°,
I_{400} is the maximum intensity at 2θ ranging from 89.0° to 91.0°,
I_{331} is the maximum intensity at 2θ ranging from 99.8° to 101.8°,
I_{420} is the maximum intensity at 2θ ranging from 103.4° to 105.4°,
$I_{333/511}$ is the maximum intensity at 2θ ranging from 132.4° to 134.4°,
I_{422} is the maximum intensity at 2θ ranging from 119.0° to 121.0°.

10. The layer according to any one of claims 6 to 9, wherein the surface has a mean linear intercept surface grain size in a range from 0.2 to 25 µm.

11. The layer according to any one of claims 6 to 10, wherein the surface hardness of the layer is at least 0.5 % higher than the cross-sectional hardness of the layer.

12. The layer according to any one of claims 6 to 11, wherein the average roughness Ra according to ISO 4287 of one surface of the layer is in a range from 0.1 nm to 100 nm (nanoscale roughness); or in a range from 100 nm to 10 µm (microscale roughness).

13. The layer according to any one of claims 6 to 12, wherein the thickness of the layer is at least 0.5 µm.

14. A device for high temperature applications, wherein the device comprises a layer according to any one of claims 6 to 13 on a surface of the device.

15. Use of a layer according to any one of claims 6 to 12 for supporting a semiconductor material.

16. The device according to claim 14, wherein the device is a wafer carrier, a high-temperature reactor component, or a high-temperature furnace component.