Patent claims

1. PVT method for the process-safe production of single crystals in an apparatus which has a highly heatable growth cell (1), a process chamber (4) in which the growth cell (1) is located and a heating device (6) surrounding the process chamber (4) for heating the growth cell (1), wherein a source material (2) and a seed (3) being introduced into the growth cell (1), the process chamber (4) being filled with a process gas and the growth cell (1) being heated, so that the source material (2) is sublimated and resublimated at the seed (3), **characterized in that** the process gas consists partly or completely of a reactive gas and in that the process chamber (4) is arranged in a containment vessel (8), an intermediate chamber (12) between a container wall (9) of the containment vessel (8) and the process chamber (4) being flooded with a protective atmosphere in order to displace the air present therein before the sublimation of the source material (2) is initiated.

2. The PVT process according to claim 1, **characterized in** that the reactive gas comprises or consists of hydrogen, and/or in that the protective atmosphere comprises or consists of an inert gas.

3. PVT process according to claim 1 or 2, **characterized in** that the containment vessel (8) is constructed in such a way that it allows gas losses to the outside, and that inert gas is supplied to compensate for gas losses and to maintain an overpressure in the containment vessel (8).

4. PVT process according to claim 3, **characterized in that**, for flooding the containment vessel (8), a first inert gas which is heavier than air is admitted into its lower region, the air being displaced upwards, for which purpose a closable outlet at the upper end of the containment vessel (8) remains open until the air has escaped.

5. PVT process according to claim 4, **characterized in** that the first inert gas is argon.

6. PVT process according to claim 4 or 5, **characterized in** that after the containment vessel (8) has been flooded once or several times with the first inert gas, it is replaced by a second inert gas, for example nitrogen.

7. PVT process according to one of the preceding claims, **characterized in** that the containment vessel (8) has a gas sensor (17) which is capable of detecting the reactive gas, and in that the process gas supply to the process chamber (4) is interrupted when the gas sensor (17) detects the reactive gas in the containment vessel (8).

8. Apparatus for the process-safe production of single crystals by the PVT method, which apparatus has a highly heatable growth cell (1) for receiving a source material (2) and a seed (3), a process chamber (4) in which the growth cell (1) is located and which has a connection to a process gas source for filling it with a process gas, and a heating device (6) for heating the growth cell (1), **characterized in** in that the apparatus has a containment vessel (8) which has a container wall (9) and in which the process chamber (4) is

arranged, and in that the containment vessel (8) has a connection to a protective gas source (14, 15) in order to be able to flood an intermediate chamber (12) between the container wall (9) of the containment vessel (8) and the process chamber (4) with a protective atmosphere before the PVT process is carried out.

9. Apparatus according to claim 8, **characterized in** that the containment vessel (8) is constructed in such a way that it allows gas losses to the outside, that it has a pressure sensor (18) and that the pressure sensor (18) is signal-connected to a control device (19), the control device (19) being designed in such a way that an overpressure in the containment vessel (8) is set on the basis of the pressure sensor signals.

10. Apparatus according to claim 8 or 9, **characterized in** that, with respect to the intended installation of the apparatus, an inert gas connection is located in the lower region of the containment vessel (8) and a closable outlet is located in its upper region.

11. Apparatus according to one of claims 8 to 10, **characterized in** that the containment vessel has two inert gas connections for two different inert gases.

12. Apparatus according to any one of claims 8 to 11, **characterized in** that the containment vessel (8) comprises a gas sensor (17) which responds to a reactive gas.

13. Apparatus according to any one of claims 8 to 12, **characterized in** that the growth cell (1) is

equipped with a silicon carbide as source material (2) and the process chamber (4) is flooded with hydrogen as reactive gas.