CLAIMS:

1. Apparatus (100) for growing crystals, the apparatus (100) comprising
a chamber (101), and
a crucible (102) being arranged in a heatable accommodation space (103) of the chamber (101),
wherein the crucible (102) comprises an inner volume (104) which is configured for growing crystals inside,
wherein the crucible (102) comprises a bottom (105) from which respective side walls (106) extend to a top section (107) of the crucible (102),
wherein the crucible (102) comprises at least one a deposition section (D1 to D7) which is configured for attaching a seed crystal (108),
wherein the deposition section (D1 to D7) is formed on at least one of the side wall (106) and the top section (107) of the crucible (102),
characterized in that the crucible (102) comprises at least one protrusion (109) extending from the side wall (106) of the crucible (102) into the inner volume (104), wherein the deposition section (D2 to D7) is formed at the protrusion (109).

2. Apparatus (100) according to claim 1,
wherein the bottom (105) is free of a deposition section (D1 to D7) for a seed crystal (108).

3. Apparatus (100) according to claim 1 or 2,
wherein the crucible (102) extends between the bottom (105) and the top section (107) along a vertical direction.

4. Apparatus (100) according to one of the claims 1 to 3,
wherein the crucible (102) comprises plurality of deposition sections (D1 to D7), each being configured for attaching a seed crystal (108),
wherein the deposition sections (D1 to D7) are spaced apart from each other and are formed on at least one of the side wall (106) and the top section (107) of the crucible (102).

5. Apparatus (100) according to one of the claims 1 to 4,

wherein ~~the crucible (102) comprises at least one protrusion (109) extending from an inner surface, in particular from the side wall (106) or the top section (107) of the crucible (102), into the inner volume (104),~~
~~wherein the deposition section (D1 to D7) is formed at the protrusion (109)~~
the protrusion is in the top section (107) of the crucible (102).

6. Apparatus (100) according to claim 5,
wherein the crucible (102) comprises a plurality of protrusions (109) extending from the inner surface of the crucible (102) into the inner volume (104),
wherein the protrusions (109) are spaced apart from each other.

7. Apparatus (100) according to one of the claims 1 to 6,
wherein the crucible (102) comprises at least one nozzle (110),
wherein the nozzle (110) is configured for injecting a reaction gas/liquid (111) into the inner volume (104) of the crucible (102).

8. Apparatus (100) according to claim 7,
wherein the at least one nozzle (110) is configured for ejecting the reaction gas/liquid (111) in a direction towards one of the deposition sections (D1 to D7).

9. Apparatus (100) according to claim 7 or 8,
wherein the crucible (102) comprises an ejection column element (112) extending partially between the bottom (105) and the top section (107) of the crucible (102),
wherein the ejection column element (112) comprises the at least one nozzle (110).

10. Apparatus (100) according to claim 9,
wherein the ejection column element (112) is coupled with a reaction gas/liquid interface (113) formed in the bottom (105) of the crucible (102).

11. Apparatus (100) according to one of the claims 1 to 10,
wherein the crucible (102) comprises a injection interface (116) for injecting an injection gas/liquid,

wherein the injection interface (116) is in particular coupleable to a pressure regulating valve (120) for regulating a pressure inside the inner volume (104).

12. Apparatus (100) according to one of the claims 1 to 11,
wherein the chamber (101) comprises a plurality of heating elements (119), which surround in particular an outer wall of the chamber (101) to provide a heat energy to the crucible (102).

13. Apparatus (100) according to claim 12,
wherein the plurality of heating elements (119) are configured for heating up the inner volume (104) to a temperature between 1350°C and 1450°C.

14. Apparatus (100) according to claim 12 or 13,
wherein the plurality of heating elements (119) is selected from one of RF heaters, resistive heater and heating generators.

15. Apparatus (100) according to one of the claims 1 to 14, further comprising
an insulating material (121) arranged in the accommodation space (103) between the crucible (102) and a wall of the chamber (101).

16. Apparatus (100) according to one of the claims 1 to 15,
wherein the crucible (102) is made of a material selected from one of the group comprising metal based, oxide based, nitride based, carbon based and dense graphite.

17. Apparatus (100) according to one of the claims 1 to 16, further comprising
a growth power enhancing device (117) to enhancing the nucleation of a crystal on the deposition site,
wherein the growth power enhancing device (117) is selected from one of the group consisting of a plasma source, microwave source and a laser source.

18. Method for growing crystals, the method comprising

attaching a seed crystal (108) to a deposition section (D1 to D7) of a crucible (102),
wherein the deposition section (D1 to D7) is formed on at least one of a side wall (106) and a top section (107) of the crucible (102),
growing crystals inside an inner volume (104) of the crucible (102) being arranged in a heatable accommodation space (103) of a chamber (101), characterized in that the crucible (102) comprises at least one protrusion (109) extending from the side wall (106) of the crucible (102) into the inner volume (104), wherein the deposition section (D2 to D7) is formed at the protrusion (109).

19. Method according to claim 18, further comprising
providing a source material (118) consisting of one of a reaction fluid, in particular liquid (111), and an injection fluid, in particular liquid (116), in the crucible (102),
wherein the source material (118) is selected from one of the group consisting of solid phase material, liquid phase material, gaseous phase ~~and mixture phase material comprising a C , H , CH solution~~.