P A T E N T C L A I M S

1. A device (100) adapted for producing energy by nuclear fission, the device (100) comprising a core container (20) of a core container material, which core container (20) encloses an inner tubing (10) of an inner tubing material, the inner tubing (10) and/or the core container (20) having an inlet (6) and an outlet (7), the device (100) further comprising a molten halide salt located in the core container (20) or in the inner tubing (10), c h a r a c t e r i s e d in that the inner tubing comprises one or more sections consisting of single crystal corundum.

2. The device (100) according to claim 1, wherein the device (100) further comprises a moderator.

3. The device (100) according to claim 2, wherein the molten halide salt is a fuel salt (1), and the halide is fluoride.

4. The device (100) according to any one of claims 1 to 3, wherein the material thickness of the inner tubing material is in the range of 1 mm to 10 mm.

5. The device (100) according to one of claims 1 to 4, wherein the one or more sections of the inner tubing (10) consisting of single crystal corundum constitute 70% to 100% of the total length of the inner tubing.

6. The device (100) according to any one of claims 1 to 5, wherein the volume of the inner tubing (10) is in the range of 10% to 90% of the total volume of the core container (20).

7. The device (100) according to any one of claims 1 to 6, wherein the core container (20) comprises a plurality of sections of the inner tubing (10) spaced at a distance in the range of 0.5 cm to 10 cm.

8. The device (100) according to any one of claims 1 to 7, wherein the single crystal corundum is doped with a transition metal.

9. The device (100) according to any one of claims 1 to 8, wherein the inner tubing comprises metallic sections consisting of a metal selected from the list consisting of nickel based superalloys, Hastelloy N, and nickel.

10. The device (100) according to any one of claims 1 to 9, wherein two or more sections consisting of single crystal corundum are connected together by a butt joint or a lap joint mechanism, or wherein a section consisting of single crystal corundum and a metallic section are connected together by a butt joint or a lap joint mechanism.

11. The device (100) according to any one of claims 1 to 10, wherein the inner tubing (10) is coated with nickel or with a Hastelloy.

12. The device (100) according to claim 11, wherein the coating has a thickness in the range of 1 μm to 100 μm.

13. The device (100) according to any one of claims 3 to 12, wherein the moderator is a molten moderator salt (2) comprising at least one metal hydroxide, at least one metal deuteroxide or a combination thereof, which molten moderator salt (2) is located in the core container (20) and the molten fuel salt (1) is located in the inner tubing (10).

14. The device (100) according to claim 13, wherein the inner tubing is made from single crystal corundum.

15. The device (100) according to claim 13 or 14, wherein the moderator salt comprises water at a concentration to provide a pH_2O in the range of 2.2 to 3.0.

16. The device (100) according to any one of claims 13 to 15, wherein the inner tubing does not have an inlet and an outlet.

17. The device (100) according to any one of claims 3 to 12, wherein the moderator is a molten moderator salt (2) comprising at least one metal hydroxide, at least one metal deuteroxide or a combination thereof, which molten moderator salt (2) is located in the inner tubing (10) and the molten fuel salt (1) is located in the core container (20).

18. The device (100) according to claim 17, wherein the moderator salt (2) comprises water at a concentration to provide a pH_2O in the range of 2.2 to 3.0.

19. A method of controlling a nuclear fission process, the method comprising the steps of:

-providing a device (100) according to any one of claims 1 to 16, the core container (20) of the device (100) having the inlet (6) and the outlet (7),

-introducing a molten fuel salt (1) into the inner tubing (10), which molten fuel salt (1) comprises halides of an alkali metal and a fissile element,

-introducing into the core container (20) a molten coolant salt,

-providing a heat exchanger (4) in fluid communication with the inlet (6) and the outlet (7) of the core container (20) so as to define a heat exchange loop (40) for removing heat from the coolant salt circulating in the heat exchange loop (40),

-circulating the coolant salt in the heat exchange loop (40) so as to control the temperature of the fuel salt (1) in the inner tubing (10).

20. The method of controlling a nuclear fission process according to claim 19, wherein the core container (20) contains a blanket of a breeder material.

21. A method of controlling a nuclear fission process, the method comprising the steps of:

-providing a device (100) according to any one of claims 1 to 15, the inner tubing (10) of the device (100) having the inlet (6) and the outlet (7),

-introducing a molten fuel salt (1) into the inner tubing (10), which molten fuel salt (1) comprises halides of an alkali metal and a fissile element,

-providing a heat exchanger (4) in fluid communication with the inlet (6) and the outlet (7) of the inner tubing (10) so as to define a heat exchange loop (40) for removing heat from the molten fuel salt (1) circulating in the heat exchange loop (40),

-circulating the molten fuel salt (1) in the heat exchange loop (40) so as to control the temperature of the fuel salt (1).

22. The method of controlling a nuclear fission process according to any one of claims 19 to 21, wherein the halide is fluoride.

23. The use of a single crystal corundum tube as a structural material in a device (100) adapted for producing energy by nuclear fission, wherein a molten fluoride salt is in contact with the single crystal corundum tube.

24. The use according to claim 23, wherein the molten fluoride salt is a molten fuel salt (1) that is contained in the single crystal corundum tube.

25. The use according to claim 23, wherein the molten fluoride salt is a molten fuel salt (1) that is in contact with an outer surface of the single crystal corundum tube.