Claims

1. Apparatus (100) for extruding liposomes, comprising the following components:
   - means for applying a hydraulic pressure *P* on a liquid medium, wherein said hydraulic pressure *P* amounting from $20*10^5$ Pa to $200*10^5$ Pa;
   - a frame (1) comprising
     a. vertical lifting unit (8);
     b. feed line (17) in fluid connection with a tempering chamber (30) located in the a housing (32), wherein the housing (32) comprises a protrusion (16) extending parallel to a central axis (A), wherein said housing (32) is mounted on said frame (1);
     c. a pressure chamber (2) comprising an outer cartridge (12), the protrusion (16) of the housing (32), a feed orifice (2.1), an inner collar (13) for mounting at least a filter element (14) at the outlet orifice, wherein
     - the cartridge (12) is linked to an outlet line (19) and mounted on a socket (4) movable in direction of the central axis (A) and being releasably coupled for an overlapping range (16.1) with the protrusion (16), wherein said socket (4) is vertically guided by said vertical lifting unit (8), wherein said pressure chamber (2) is designed for bearing said hydraulic pressure *P*
   - at least one porous filter element (14) defining an outlet of said pressure chamber (2) and/or cartridge (12), wherein said filter element (14) comprises open pores having a diameter *D,* wherein said pore diameter *D* amounting from $80*10^{-9}$ m to $50*10^{-6}$ m or from $100*10^{-9}$ m to $5*10^{-6}$ m;
   - a lifting mechanism (5) as part of the lifting unit (8) designed for elevating and lowering the socket (4);
   - wherein said filter element (14) is contained in a (filter) cartridge (12) which is removably mounted to the socket (4);
   - and wherein said lifting mechanism (5) comprises at least one rack (6) and pinion (7) gear, wherein the pinion (7) is pivot-mounted in said lifting unit (8) which is mounted in said frame (1) and the rack (6) is vertically guided.

2. Apparatus (100) according to claim 1, further comprising a lever (9) for pivoting said pinion (7) between a first angle position and a second angle position relatively to the frame (1), wherein in said first angle position, the cartridge (12) on the socket (4) is approximated to the protrusion (16) and wherein in said second angle position the cartridge (12) on the socket (4) is lowered.

3. Apparatus according to claim 1 or 2, wherein in a ring segment (3) is mounted concentrically to the protrusion (16) having an inner channel 15 parallel to axis (A) and

form-locking to serve as a guiding channel for the cartridge (12), wherein the ring segment (3) is protruding from the protrusion (16).

4. Apparatus according to claim 3, wherein the ring segment 3 is mounted concentrically to the protrusion (16) on
i) the bottom of the housing (32) or
ii) a portion of the frame (1).

5. Apparatus according to claim 2 or 3, wherein in said first angle position filter cartridge (12) is plugged into the ring segment (3).

6. Apparatus according to claim 2 or 3, wherein in said first angle position vertical lifting unit (8) is fixable to the frame (1) such that flux of force between socket (4) and ring segment (3) is transferred at least partly over vertical lifting unit (8) and frame (1).

7. Apparatus (100) according to at least one of claims 1 to 6, wherein said filter (14) element is a plain plate made of a porous material selected from the group consisting of polycarbonate, sintered metal, and metal foil, preferably of circular shape.

8. Apparatus according to at least one of claim 1 to 7, wherein the rack (6) is integrated into said vertical lifting unit (8).

9. Apparatus according to at least one of claim 1 to 8, wherein the chamber (30) having feed line (24), and wherein at least one (first) segment (17.1) of the feed line (17) crossing the tempering chamber (30).

10. Apparatus according to claim 9, wherein at least three segments of the feed line (17) crossing the tempering chamber (30), wherein
- the first segment (17.1) is leading to a ring tube (18),
- a second segment of the feed line (17) is defined by the ring tube (18), and
- a third segment (17.2) is leading from the outlet of the ring tube (18) to the feed orifice (2.1) of the pressure chamber (2).

11. Apparatus according to at least one of claim 1 to 10, comprises a venting line (22) connected to the feed line (17) and/or a segment of the feed line upstream to the pressure chamber (2), preferably in direct neighbouring the feed orifice (2.1) of the pressure chamber (2).

12. Process for preparing target liposomes from liposome precursors, with the following steps:
    a) providing an apparatus (100) for extruding liposomes, wherein said apparatus (100) comprises at least one filter element (14);
    b) providing a feed dispersion comprising liposome precursors dispersed in a liquid dispersion medium;
    c) applying a hydraulic pressure *P* amounting from $20*10^5$ Pa to $200*10^5$ Pa on said feed dispersion to obtain a pressurized feed dispersion;
    d) extruding said pressurized feed dispersion through said filter element (14) to obtain an extruded dispersion comprising target liposomes dispersed in dispersion medium;
    e) optionally: recovery of target liposomes from extruded dispersion;

    wherein

    an apparatus (100) for extruding liposomes according to at least one of claims 1 to 11 is provided.

13. Process according to claim 12, whereby the process is performed until reaching a defined clogging degree of said filter element (14) by losing penetrability, wherein after reaching defined clogging degree apparatus (100) is depressurized, ring segment (3) and socket (4) are released from each other, ring segment (3) is elevated, filter cartridge (12) containing filter element (14) with reduced penetrability is replaced by a fresh filter cartridge (12) containing a fresh filter element (14), ring segment (3) is lowered, socket (4) and ring segment (3) are recoupled with each other, apparatus (100) is repressurized and process is continued.

14. Process according to claim 12 or 13, whereby the volume of provided feed dispersion is between 0.1 l and 10 l or between 100ml and 2000ml.

15. Process according to claim 12 to 14, performed for purpose of product development, whereby the apparatus is designed for liposome extrusion at small scale for product development, namely sizing of liposome precursors to target liposomes in a dimension of 50 nm to 300 nm, preferred 80 nm to 150 nm.