Claims

1. A cell-culture bottle (1) comprising
   - a vessel (10) comprising three subregions: a base region (12), a lid region (14) and a cylinder region (16) arranged therebetween,
   - an Archimedes' screw (30) arranged internally in the cylinder region (16) of the vessel (10) and having a central tube (40) which is arranged along the central axis of said Archimedes' screw (30) and through which liquid is flowable,
   - at least one wall (50) which is arranged concentrically around the central tube (40) and which extends over the entire cylinder region (16) of the vessel (10),

   characterized in that the cell-culture bottle is formed as one piece and wherein the central tube (40) is designed such that it has a first opening (41) on the outer side of the vessel (10) in the lid region (14) and has a second opening (42) inside the vessel (10) on the bottom side of the cylinder region (16) and wherein the Archimedes' screw (30) is integrally connected to the cylinder region (16) of the vessel (10) and to the at least one wall (50), wherein the Archimedes' screw (30) and the at least one wall (50) are arranged such that a fluid can pass along the Archimedes' screw (30) from the bottom side of the cylinder region (16) into the lid region (14) of the vessel (10) upon rotation of the cell-culture bottle (1).

2. The cell-culture bottle (1) as claimed in claim 1, **characterized in that** the vessel (10) has an opening (11) in the lid region (14) beyond the central tube (40).

3. The cell-culture bottle (1) as claimed in claim 1 or 2, **characterized in that** the cell-culture bottle (1) has a coating comprising polysaccharides and/or peptides, wherein said coating is applied on the surface of the Archimedes' screw (30), the at least one wall (50) and/or the internal side of the vessel (10), so that cells can adhere to the inner surfaces of the cell-culture bottle (1) and grow thereon.

4. The cell-culture bottle (1) as claimed in any of the preceding claims, **characterized in that** it has a closed base region (12), wherein the cell-culture bottle (1) is designed to be closed on the bottom side of the cylinder region (16), wherein the base region (12) is integrally connected to the cylinder region (16).

5. The cell-culture bottle (1) as claimed in any of the preceding claims, **characterized in that** the cell-culture bottle (1) has a rotation mechanism for rotation of the vessel (10), wherein said rotation mechanism is attachable to the base region (12) of the vessel (10).

6. The cell-culture bottle (1) as claimed in any of the preceding claims, **characterized in that** the cell culture bottle (1) has a filter in the central pipe (40).

7. The cell-culture bottle (1) as claimed in any of the preceding claims, **characterized in that** the central tube (40) has a third opening (43), wherein said third opening (43) is located at the point of contact between the central tube (40) and the lid region (14) of the vessel (10), so that fluid can get from the base region (12) to the lid region (14) of the vessel (10) via the Archimedes' screw (30) and can, via the third opening (43) into the central tube 40, flow back to the bottom side of the cylinder region (16) of the vessel (10).

8. The cell-culture bottle (1) as claimed in any of the preceding claims, **characterized in that** it is made of a material suitable for additive manufacturing.

9. The cell-culture bottle (1) as claimed in claim 8, **characterized in that** the material is selected from the group consisting of acrylonitrile butadiene styrene (ABS), acrylate styrene acrylonitrile (ASA), high-impact polystyrene (HIPS), thermoplastic elastomers (TPE), polycarbonates (PC), polylactides (PLA), polyethylene terephthalate (PET), polyethylene terephthalate glycol (PETG), polymethyl methacrylate (PMMA) or polyvinyl alcohol (PVA or PVOH).

10. A culturing system, **characterized in that** it comprises a cell-culture bottle (1) as claimed in any of claims 1 to 9.

11. The use of a cell-culture bottle (1) as claimed in any of claims 1 to 9 for culturing of cells.

12. A method for culturing cells in a cell-culture bottle (1) as claimed in any of claims 1–9, comprising at least the steps of:

a) filling the cell-culture bottle (1) with fluid;
b) adding the cells to be cultured to the cell-culture bottle (1);
c) rotating the cell-culture bottle (1), so that the fluid is distributed and covers the cells, so that the cells can settle in the vessel (10), in the Archimedes' screw (30), on the at least one wall (50) and the central tube (40) and divide;
d) removing the fluid at a certain cell density;
e) adding a buffer to the cell-culture bottle (1) in order to wash the cells;
f) detaching the cells from the vessel (10), the Archimedes' screw (30), the at least one wall (50) and the central tube (40);
g) stopping the detachment reaction by addition of fresh fluid;
h) removing the fluid containing detached cultured cells.