Claims

1. A method for producing a three-dimensional, multi-cell object, comprising the following steps:

   a) introducing a first photopolymerizable liquid into a reaction vessel (4),

   b) focusing a first light beam on a first focal plane that lies within an area of the reaction vessel (4) filled with the first liquid,

   c) producing a first polymerized structure in a first layer in the reaction vessel (4) by means of the first light beam,

   d) introducing a further photopolymerizable liquid into the reaction vessel (4), so that a previously produced polymerized structure is at least partially covered with the further photopolymerizable liquid,

   e) focusing a further light beam on a further focal plane that lies within an area of the reaction vessel (4) filled with the further liquid,

   f) producing a further polymerized structure in a further layer in the reaction vessel (4) by means of the further light beam, wherein the further polymerized structure is arranged directly on the previously produced polymerized structure and is connected thereto,

   g) repeating steps d) through f) with one further photopolymerizable liquid each until the three-dimensional multi-cell object is produced,

   wherein the first photopolymerizable liquid and/or at least one of the further photopolymerizable liquids contain(s) biological cells,

   characterized in that more than one polymerized structure is produced in the same layer.

2. The method as claimed in claim 1, **characterized in that** the first photopolymerizable liquid and at least one of the further photopolymerizable liquids are different liquids.

3. The method as claimed in claim 1 or 2, **characterized in that** the further photopolymerizable liquid is not introduced into the reaction vessel (4) until the

photopolymerizable liquid previously present in the reaction vessel (4) has been removed from the reaction vessel (4).

4. The method as claimed in one of the preceding claims, **characterized in that** a carrier plate (15) is arranged in the reaction vessel (4) to which the first polymerized structure is bonded.

5. The method as claimed in one of the preceding claims, **characterized in that** refocusing in an optical system (5), which is arranged between a light source (2) for producing the first and/or the further light beam and the reaction vessel (4), is carried out in order to change the focal plane inside the reaction vessel (4).

6. The method as claimed in one of the preceding claims, **characterized in that** a relative movement between the reaction vessel (4) or a carrier plate (15) arranged in the reaction vessel (4) on the one hand and a light source (1, 2) for producing the first and/or the further light beam on the other hand is carried out in order to change the focal plane.

7. The method as claimed in one of the preceding claims, **characterized in that** the first and/or the further light beam is directed onto a defined and predefinable area in the respective focal plane within the first photopolymerizable liquid and/or the further photopolymerizable liquid.

8. The method as claimed in one of the preceding claims, **characterized in that** at least the first polymerized structure in the first layer is irradiated from two directions with the first light beam.

9. The method as claimed in one of the preceding claims, **characterized in that** the first light beam and/or the further light beam has a wavelength in the range of 200 to 1000 nm.

10. The method as claimed in one of the preceding claims, **characterized in that** the first light beam and/or the further light beam has a wavelength in the range of 380 to 780 nm.

11. The method as claimed in one of the preceding claims, **characterized in that** during the production of the three-dimensional, multi-cell object, at least one element is integrated into the three-dimensional multi-cell object that is selected from the group composed of membranes, channels, pores, sensors, electrically conductive carriers, and chemotactic preparations.

12. A device for producing a three-dimensional, multi-cell object from photopolymerizable liquids, with

- a reaction vessel (4),
- a light source (1, 2), which is arranged such that during operation of the device, it can irradiate light in a focal plane into the reaction vessel (4),
- a reservoir (7) for different photopolymerizable liquids,
- a pump (9) that can be brought into fluid communication with the reservoir (7) and the reaction vessel (4) in order to introduce the different photopolymerizable liquids into the reaction vessel (4) and discharge them from the reaction vessel, and
- a control unit (13) for controlling the light source (1, 2) and the pump (9),

characterized in that the control unit is suitable to control the light source such that in a second polymerization step the light source radiates light onto regions within a focal plane that were not irradiated with light in a first polymerization step in the same focal plane.

13. The device as claimed in claim 12, **characterized in that** the light source (1, 2) is provided and configured to emit light of different wavelengths, wherein the wavelength of the light to be emitted can be predetermined.

14. The use of a device as claimed in claim 12 or 13 for producing an artificial organ or a pregnancy model.