

Description

[0001] The invention relates to a sample carrier module comprising a sample module base, a carrier lid and at least one sample slide holder for holding a sample slide in an interior of the sample carrier module.

[0002] The invention also relates to a sample processing device.

[0003] Currently, samples on slides are stored in freezers and for processing, such as for example sample preparation, the sample slides are being transported in a plastic carrier towards the sample preparation device. For preparation in the sample preparation device, the slide is taken out of the freezer, put into the plastic carrier for transport and is removed again in the laboratory for example to be placed in a sample processing device.

[0004] During these operations, risk of condensation leading to delocalization exists as soon as the sample slide leaves the freezer, because the sample slide is exposed several times to a non-controlled environment. The humidity of the environment may condensate upon the frozen sample, which can happen during transport in the plastic carrier as the sample reaches a certain temperature for further processing, for example room temperature, but also after transport when taking out the sample from the carrier in the laboratory for further processing. Hence, variation in the non-controlled environment conditions such as temperature and relative humidity during transport and unloading negatively influences reproducibility of the samples prepared in a subsequent process.

[0005] It is an object to provide a sample carrier module facilitating a more efficient workflow for transporting and processing to increase reproducibility of the samples being processed.

[0006] This object is achieved with a sample carrier module according to claim 1.

[0007] The sample carrier module comprises a sample module base, a carrier lid and at least one sample slide holder for holding a sample slide in an interior of the sample carrier module.

[0008] The sample carrier module has a transport mode and a processing mode.

[0009] In the transport mode of the sample carrier module, the carrier lid covering the sample slide holder extends substantially parallel to the sample slide holder and seals the interior of the sample carrier module to prevent contact between the interior of the sample carrier module and the exterior atmosphere. Hence, in the transport mode the sample carrier module allows sample transport in a controlled environment with no or at least reduced risk of condensation upon the sample being transported. During transport of a sample in the sample carrier device between freezer and a sample processing device, for example a sample preparation device, it is possible by means of the carrier lid hermetically sealing the interior of the sample carrier module to keep the sample or samples at a relatively constant humidity and relatively con-

stant temperature. In other words, the sample carrier module in the transport mode eliminates or reduces contact between the sample and the exterior atmosphere which increases reproducibility of the samples prepared in a subsequent process.

[0010] In addition, the sample carrier module has a processing mode. In the sample carrier module, the carrier lid of the sample carrier module is detachably attachable to the sample module base. In the processing mode the carrier lid is removable from the sample module base, wherein after the carrier lid is removed, as a result of the parallel orientation of the sample slide holder holding the sample slide with the sample, a sample on the sample slide holder is immediately ready for preparation/processing in the sample preparation device. Hence, the transfer step of the sample slide from the carrier into the sample processing device can be omitted such that the number of operations in the sample preparation process can be reduced to obtain an efficient workflow. Further, the omission of this step also increases the reproducibility of the samples being processed/prepared, because without this transfer step the sample is not or not as long exposed to the exterior atmosphere. In addition, omission of this transfer step accelerates sample preparation.

[0011] In particular in the field of mass spectrometry imaging (MSI) using a matrix-assisted laser desorption/ionization (MALDI), one of the most critical steps is to control the transport environment and the processing environment of the sample to be prepared to increase reproducibility of samples prepared in the sample preparation process.

[0012] Further, toxic chemicals can be used during sample preparation, because the sample carrier module also allows a safe transport after sample processing/preparation due to its hermetic closure in the transport mode by means of the carrier lid with no or minimal risks for an operator.

[0013] In addition, samples containing Genetically Modified Organisms (GMOs) and/or micro-organisms (GMMs) can be transported in the sample carrier module as a result of the hermetically sealing by the carrier lid of the interior of the sample carrier module in the transport mode. GMOs can be defined as organisms (and micro-organisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating or natural recombination.

[0014] The carrier lid can be removed from and positioned on the sample module base manually and/or mechanically. In particular, when toxic materials are being used for processing/preparing the sample inside the sample processing device mechanically positioning/removing the carrier inside the sample processing device can be preferred to improve operator safety.

[0015] In one aspect, the at least one sample slide holder has at least one alignment mechanism for holding a sample slide in a predetermined position in the sample slide holder. If the position of the sample slide is known,

this facilitates automatic processing in a subsequent process in a processing device. The sample slide is often a standard slide with standard dimensions and the sample is located within a predefined section on the slide. The slide is a thin plate, a foil or a glass substrate. The alignment mechanism may define a window in which the sample slide is positionable, wherein after positioning the sample slide inside the window, a window edge at least partially contacts an edge of the sample slide for automatically aligning the sample slide in the sample slide holder. In other words, the sample slide is automatically positioned in a predetermined position for further processing of the sample upon insertion of the sample slide in the sample carrier module in one single step. In addition, the window, in particular the window edge facilitates the sample slide insertion process for an operator and reduces the risk of incorrect placement by an operator. The window edge is configured to cover a portion of a sample slide surface facing away from the sample module base. In this way, it is prevented in an effective way that the sample slide (accidentally) moves upwards for example during transport or during processing thereby losing contact with the window edge such that the sample slide is moved out of the predetermined position for further processing.

[0016] In one other aspect, the sample slide holder is detachably attachable to the sample module base. Removing the sample slide holder from the sample module base facilitates and speeds up the sample slide insertion process by an operator such that the sample slide loading time is minimal with minimal exposure of the sample slide to a non-controlled environment.

[0017] In one further aspect, the sample module base is configured to hold the sample slide holder in a predetermined position. In particular, when the sample slide holder is detachably attachable to the sample module base, it is advantageous for the subsequent processing of the sample in the processing mode that the sample slide holder is in a predetermined position in the sample module base. The sample slide holder may be supported by a support surface of the sample module base extending parallel to a carrier lid support surface of the sample module base for supporting the carrier lid, wherein at least a portion of an edge between the support surface and the carrier lid support surface holds the sample slide holder in the predetermined position. An effective and user friendly way of loading the sample slide holder in the sample module base is provided by the edge between the support surface and the carrier lid support surface. In this configuration, the sample slide holder is located in the predetermined position between the sample module base and the carrier lid in the transport mode, wherein in the processing mode without the carrier lid a sample on the sample slide held by the sample slide holder in the predetermined position is directly accessible for further processing of the sample.

[0018] In one aspect of this disclosure, the sample carrier module comprises at least one sample conditioning

mechanism. The sample conditioning mechanism(s) is/are configured to provide a constant and controllable interior environment in the sample carrier module, in particular in the transport mode of the sample carrier. The sample conditioning mechanism may include a dryer for drying a sample and/or sustaining a state of dryness of the sample. The dryer is for example a desiccant box to be positioned in a receiving section in the sample module base. Hence, the sample carrier module is able to simultaneously dry and transport the sample. By positioning a dryer below the sample slide held by the sample slide holder effective drying of the sample can be done in a minimal time frame of for example one minute. Such a minimal drying time in the sample carrier module without additional transfer steps for drying the sample, is for example advantageous for some metabolites, because of their half-life of 1.5 minutes.

[0019] The sample conditioning mechanism may comprise a temperature conditioner provided in the sample module base and/or in the carrier lid for controlling the temperature in the transport mode for example allowing the sample to reach the necessary room temperature for further processing with less or even without the risk of condensation in a relatively fast manner. Further, the temperature conditioner may allow a processed sample to be exposed to a predetermined temperature or temperature profile in time, but also in the processing mode in a processing device a predetermined temperature or temperature profile in time for the sample may be desired for example for depositing a layer on the sample.

[0020] The carrier lid is connected to the sample module base by means of a releasable form-closed connection. This is an effective and relatively easy way of attaching the carrier lid to the sample module base for hermetically sealing the interior and for removing the carrier lid from the sample module base. A releasable form-closed connection can also be implemented in a user friendly way, because an operator may manually open and close the sample carrier module without using any tools.

[0021] The carrier lid may also be connected to the sample module base by means of a releasable force-closed connection, preferably including a connection created by magnetic force.

[0022] It is a further object to provide a sample processing device providing a more efficient sample processing process.

[0023] This object is achieved with a sample processing device as claimed in claim 13.

[0024] The sample processing device comprises an alignment tool and a sample carrier module as described in this disclosure, wherein the sample carrier module has an alignment feature configured to cooperate with the alignment tool for positioning the sample carrier module inside the sample processing device in a position for automatically preparing a sample in the sample carrier module in the processing mode without the carrier lid by the sample processing device. Upon insertion of the sample

carrier module inside the processing device, the sample carrier module in the processing mode without the carrier lid is automatically aligned inside the processing device capable of providing automatic sample processing, for example automatically spraying a thin matrix solution on the sample by means of a spray head. The sample processing device has no hindrance of the carrier lid during sample processing as the carrier lid is removed from the sample carrier base and displaced to a storage position outside the sample preparation area in the sample processing device.

[0025] The present invention will be explained in more detail below with reference to the appended figures showing exemplary embodiments, in which:

Figure 1 is a perspective exploded view of the sample carrier module;

Figure 2 is a perspective view of the sample carrier module in the processing mode with a carrier lid of the sample carrier module removed from the sample carrier module;

Figure 3 is a perspective view of the sample carrier module shown in figures 1 and 2 and a sample processing device;

Figure 4 is a perspective view of the sample processing device after insertion of the sample carrier module therein;

Figure 5 is a perspective view of the sample processing device ready for processing a sample carried by the sample carrier module;

Figures 6 and 7 show a top view and cross section of an alternative sample carrier module.

[0026] In the following description identical or corresponding parts have identical or corresponding reference numerals. Each feature disclosed with reference to a specific figure can also be combined with another feature disclosed in this disclosure, unless it is evident for a person skilled in the art that these features are incompatible.

[0027] Figures 1 and 2 show a sample carrier module 1 comprising a sample module base 3, at least one sample slide holder 5 for holding a sample slide 6 (figure 2) inside an interior of the sample carrier module 1 and a carrier lid 7. The carrier lid 7 has a viewing window 12 made of glass for inspecting a sample on a sample slide 6 in the transport mode.

[0028] The sample carrier module 1 further comprises a sample conditioning mechanism which in the embodiment of the sample carrier module 1 shown in figures 1 and 2 is a dryer for drying a sample and/or sustaining a state of dryness of the sample on a sample slide 6 positioned in the sample carrier module 1. The dryer is a detachable desiccant box 9 to be positioned in a receiving section 11 in the sample module base 3 below the sample holder 5.

[0029] In a transport mode of the sample carrier module 1, the carrier lid 7 is connected to the sample module base 3 by means of a releasable form-closed connection,

preferably a quick release coupling. In the sample carrier module 1 the releasable form-closed connection comprises a pivotable hook 15 having a first receiving slot 15a for receiving a portion of a first step 17a of a first stepped edge 17 of the carrier lid 7 and a vertically protruding connection element 21 which defines a portion of a longitudinally extending side wall 22 of the sample sample module base 3. The connection element 21 defines a second receiving slot 21a for receiving a first step 19a of a second stepped edge 19 of the carrier lid 7. The second stepped edge 19 is located on an opposite side of the carrier lid 7 with respect to the first stepped edge 17. The stepped edges 17, 19 extend in a longitudinal direction L of the carrier lid 7 and may be constructed in an identical manner as shown in figures 1 and 2. The receiving slot 15a of the pivotable hook 15 is shorter seen in a longitudinal direction L of the sample carrier module 1 than the stationary receiving slot 19a of the connection element 21, which extends substantially over the full length L of the sample module base 3.

[0030] In the transport mode of the sample carrier module 1 the carrier lid 7 covers the sample slide holder 5 completely and the carrier lid 7 extends parallel to the sample slide holder 5. In the transport mode the carrier lid 7 seals the interior of the sample carrier module 1 to prevent contact between the interior of the sample carrier module 1 and the exterior atmosphere.

[0031] As shown in figures 1 and 2, the carrier lid 7 is detachably attachable to the sample module base 3 such that the carrier lid 7 is removable from the sample module base in a processing mode as shown in figure 2 of the sample carrier module 1.

[0032] The sample carrier module 1 allows sample transport by means of the carrier lid 7 in a sample protected manner against influences of an exterior atmosphere and by integrating a desiccating box 9 the interior environment in the transport mode can be controlled for the parameter humidity. The sample carrier module 1 allows the sample to reach the necessary temperature for further processing without or with a reduced risk of condensation.

[0033] The sample module base 3 and the sample slide holder 5 allow controlled alignment of the sample into a sample preparation device to be discussed below, for example into a device for depositing a chemical of one or more components onto the sample on the sample slide 6 held by the sample slide holder 5. The sample slide holder 5 is configured to hold two sample slides 6 in a predetermined/aligned position. The alignment mechanism of the sample slide holder 5 for holding each of the two sample slides 6 is a window 30, 31 in which the sample slide is positionable, wherein after positioning the sample slide inside the window 30, 31 the four window edges 30a, 30b, 30c, 30d; 31a, 31b, 31c, 31d at least partially contact the four edges of the sample slide. In other words, the sample slides 6 are automatically positioned in a predetermined position by means of the windows 30, 31 for further processing of the sample upon

insertion of the sample slide 6 in the sample slide holder 5 in one single step. The opposite portions defining the window edges 30a, 31a, as clearly shown in figure 1, can also be connected to each other by a connection element (not shown), such that the two sample slide side edges contact the connection element. In this way, the slides 6 and the connection element contacting the slide side edges 6 in the longitudinal direction L provide a protection in the processing mode of the sample carrier module for the box 9 below the slides 6.

[0034] In addition, the longitudinally opposing window edges 30b, 30d; 31b, 31d are configured to cover a minimal portion of an upper sample slide surface facing away from the sample module base 3 and facing the carrier lid 7 in the transport mode. This can be achieved by providing a groove in the window edge comparable to the slot 21a of the connection element 21, wherein in the grooves the longitudinally opposing sides of the sample slide 6 can be attached. By means of the window edges having grooves, the risk is reduced that the sample slides (accidentally) move upwards out of the predetermined position for further processing for example during transport or during processing.

[0035] In one other aspect, the sample slide holder 5 is detachably attachable to the sample module base 3. Removing the sample slide holder 5 from the sample module base facilitates and speeds up the sample slide insertion process by an operator such that the sample slide loading time is minimal with minimal exposure of the sample slide to a non-controlled environment.

[0036] The sample module base 3 is further configured to hold/support the sample slide holder in a predetermined position in the sample module base 3. The sample slide holder 5 is supported by a support surface 31 (figure 2) of the sample module base 3, wherein the slide holder support surface 31 extends parallel to a carrier lid support surface 33 of the sample module base 3. An edge 35 between the support surface 31 and the carrier lid support surface 33 surrounds a substantial portion of the circumferential edge 8 of the sample slide holder 5, i.e. in the rectangular design of the sample slide holder 5 shown in figures 1 and 2 each of the four circumferential edges contacts the edge 35 of the sample module base 3 to hold the sample slide holder 5 in the predetermined position for subsequent processing in the processing mode of the sample carrier module 1. Other shapes of the edge 35 and the sample slide holder 5 are also possible. This configuration provides an effective and user friendly way of loading the sample slide holder 5 in the sample module base 3 and simultaneously positioning of the sample slide holder 5 in the predetermined position for subsequent processing in the processing mode of the sample carrier module 1, i.e. in the processing mode without the carrier lid 7 a sample on the sample slide 6 held by the sample slide holder 5 in the predetermined position is directly accessible for further processing of the sample. In the transport mode the sample slide holder 5 is also located in the predetermined position between a bottom of the

sample module base 3 and the carrier lid 7.

[0037] Figures 3-5 show a sample processing device, in particular a sample preparation device 100. The sample preparation device 100 defines a chamber 101 of which the chamber pressure can be controlled. For example, a vacuum pump (not shown) can be connected to the chamber 101 to create a desired atmosphere above a sample. Inside the chamber 101 a spray head 108 can be moved for depositing a substance by spraying on the sample being prepared. The sample or samples are positioned in a sample carrier module 1 as described in this disclosure.

[0038] The sample preparation device 100 comprises an alignment tool 110, i.e. an adapter 110 fixed or fixable to the bottom 112 of the chamber 101. The adapter 110 is provided with a receiving section 114 for receiving the sample carrier module 1.

[0039] The sample carrier module 1 has an alignment feature configured to cooperate with the adapter 110 for positioning the sample carrier module 1 inside the sample preparation device 110 in a predetermined position in the chamber 101 for automatically preparing a sample in the sample carrier module 1 in the processing mode without the carrier lid 7 by the sample preparation device 110. The alignment feature is at least a portion 3a, 3b of the outer circumference of the sample module base 3 of the sample carrier module 1. The dimensions of the receiving sections and the outer dimensions of the sample carrier module 1 correspond such that the sample carrier module 1 is positionable inside the receiving section 114 substantially without play.

[0040] As shown in figure 4 the sample carrier module 1 is positioned inside the adapter 110 of the sample preparation device 100. Before starting the sample preparation process a protective plate 120 (figure 5) is positioned over the surface 33 (figure 2) of the sample module base 3. The protective plate 120 has at least one sample processing window 122 positionable over the samples to be prepared.

[0041] The protective plate 120 further comprises an opening 124 having dimensions corresponding to the protruding connection element 21 of the sample base module 3, wherein the opening 124 is positioned over the protruding connection element 21 such that the protruding connection element 21 is surrounded by the opening 124 substantially without play. In other words, the opening 124 is at least one alignment element to align the at least one sample processing window 122 of the protective plate 120 with at least one sample in the sample carrier module 1. The protective plate 120 protects the other parts of the sample carrier module 1 against the substance being sprayed by the spray head 108. Hence, the sample carrier module 1 requires no or minimal cleaning after sample preparation in the sample preparation device 100.

[0042] The sample module base 3 can also, without an adapter 110, be positioned in a predetermined position inside a sample preparation device 100, for exam-

ples by markers (not shown) on the bottom 112 of the device 100 for aligning the outer circumference of the sample carrier module 1 with the markers.

[0043] Figures 6 and 7 show in a schematic view a top view of a sample carrier module 201 without the carrier lid 207 and a cross section of the sample carrier module 201 shown in figure 6 with the carrier lid 207.

[0044] The sample module base 203 comprises four sample slide holders 205a,b,c,d and sample conditioning mechanisms. The sample conditioning mechanisms of the sample module base 203 comprise a temperature conditioner, i.e. a Peltier heating/cooling element 250, a first reservoir 252 for receiving a solvent or a desiccant and a second reservoir 254 for receiving a solvent or a desiccant. Although, not shown, it is also possible that the sample conditioning mechanism comprises a mechanism or a connector for such a mechanism to maintain a desired pressure difference between the interior of the sample carrier module in the transport mode and the exterior atmosphere

[0045] The carrier lid 207 is detachably connected to the sample module base 203 by means of a releasable force-closed connection (not shown), for example a connection created by magnetic force. By applying a force greater than the magnetic force, the carrier lid 207 can be removed from the sample module base 203.

[0046] The carrier lid 207 comprises sample conditioning mechanisms, i.e. a Peltier heating/cooling element 260.

[0047] The sample carrier module 201 also has a transport mode and processing mode identical to the sample carrier module 1. Hence, in the transport mode of the sample carrier module 201 the carrier lid 207 covering the sample slide holders 205a,b,c,d extends substantially parallel to the sample slide holders 205a,b,c,d and seals the interior of the sample carrier module 201 to prevent contact between the interior of the sample carrier module 201 and the exterior atmosphere. Further, the carrier lid 207 is detachably attachable to the sample module base 203 such that the carrier lid 207 is removable from the sample module base 203 in a processing mode of the sample carrier module, for example in the sample preparation device 100 shown in figures 3-5.

[0048] The sample module base 203 may comprise a bottom having guiding holes (not shown) for positioning over guiding pins (not shown) on the bottom 112 of the chamber 101 of the sample preparation device 100 shown in figures 3-5 to align the sample module base 203 carrying samples to be prepared by the spray head 108 in a predetermined position inside the chamber 101 of the sample preparation device 100.

[0049] The portable sample carrier 201 is able to create a micro-environment for the samples in the transport mode, in particular also after sample preparation while moving the sample in the sample carrier 201 out of the device 100 to a remote location for example for continued enzymatic digestion after being sprayed with enzyme or matrix or further analysis.

[0050] The sample carrier 1, 201 can be provided with sensors or connectors for sensors for sensing the interior conditions in the transport mode. For example, a hygrometer or a temperature sensor can be used.

Claims

1. A sample carrier module comprising a sample module base, a carrier lid and at least one sample slide holder for holding a sample slide in an interior of the sample carrier module, wherein in a transport mode of the sample carrier module the carrier lid covering the sample slide holder extends substantially parallel to the sample slide holder and seals the interior of the sample carrier module to prevent contact between the interior of the sample carrier module and the exterior atmosphere, wherein the carrier lid is detachably attachable to the sample module base such that the carrier lid is removable from the sample module base in a processing mode of the sample carrier module.
2. The sample carrier module according to claim 1, wherein the at least one sample slide holder has at least one alignment mechanism for holding a sample slide in a predetermined position in the sample slide holder, preferably the alignment mechanism defines a window in which the sample slide is positionable, wherein after positioning the sample slide inside the window, a window edge at least partially contacts an edge of the sample slide.
3. The sample carrier module according to claim 1 or 2, wherein the carrier lid has a viewing window made of a transparent material, for example glass or plastic.
4. The sample carrier module according to claim 3, wherein the window edge is configured to cover a portion of a sample slide surface facing away from the sample module base.
5. The sample carrier module according to any preceding claim, wherein the sample slide holder is detachably attachable to the sample module base.
6. The sample carrier module according to any preceding claim, wherein the sample module base is configured to hold the sample slide holder in a predetermined position, preferably the sample slide holder is supported by a support surface of the sample module base extending parallel to a carrier lid support surface of the sample module base for supporting the carrier lid, wherein at least a portion of an edge between the support surface and the carrier lid support surface holds the sample slide holder in the predetermined position.

7. The sample carrier module according to any preceding claim, wherein the sample carrier module comprises at least one sample conditioning mechanism.
8. The sample carrier module according to claim 7, wherein the at least one sample conditioning mechanism is a dryer for drying a sample and/or sustaining a state of dryness of the sample, for example the dryer is a desiccant box to be positioned in a receiving section in de sample module base. 5 10
9. The sample carrier module according to claim 7 or 8, wherein the at least one sample conditioning mechanism comprises a temperature conditioner provided in the sample module base and/or in the carrier lid. 15
10. The sample carrier module according to any preceding claim, wherein the carrier lid is connected to the sample module base by means of a releasable form-closed connection. 20
11. The sample carrier module according to any preceding claim 1-9, wherein the carrier lid is connected to the sample module base by means of a releasable force-closed connection, preferably including a connection created by magnetic force. 25
12. The sample carrier module according to any preceding claim, wherein the sample slide holder is configured for holding at least two slide holders, preferably the sample slide holder is configured for holding more than two slide holders. 30
13. A sample processing device comprising an alignment tool and a sample carrier module according to any preceding claim, wherein the sample carrier module has an alignment feature configured to cooperate with the alignment tool for positioning the sample carrier module inside the sample processing device in a position for automatically preparing a sample in the sample carrier module in the processing mode without the carrier lid by the sample processing device. 35 40 45
14. The sample processing device according to claim 13, wherein the alignment tool is an adapter provided with a receiving section and the alignment feature is at least a portion of the outer circumference of the sample carrier module to be positioned in the receiving section, preferably the alignment feature is at least a portion of the outer circumference of the sample module base of the sample carrier module. 50
15. The sample processing device according to claim 13 or 14, wherein a protective plate having at least one sample processing window is positionable over the sample carrier module in the processing mode with- 55
- out the carrier lid, preferably by using at least one alignment element to align the at least one sample processing window with at least one sample in the sample carrier module.

Fig. 1

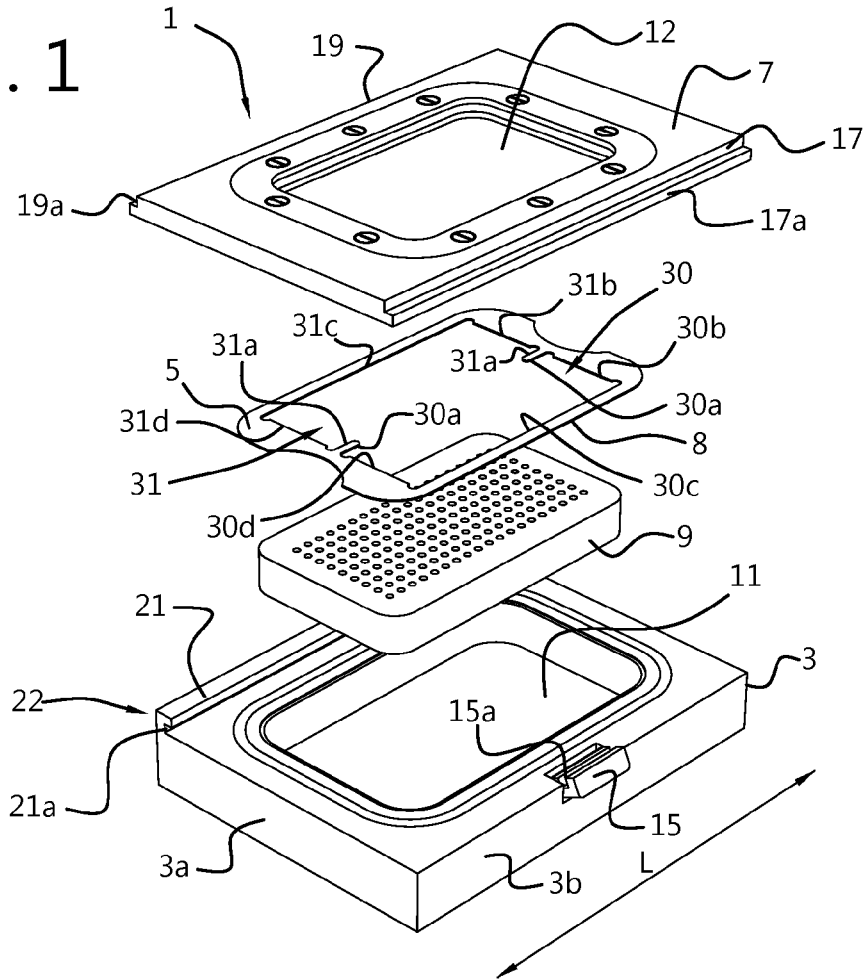


Fig. 2

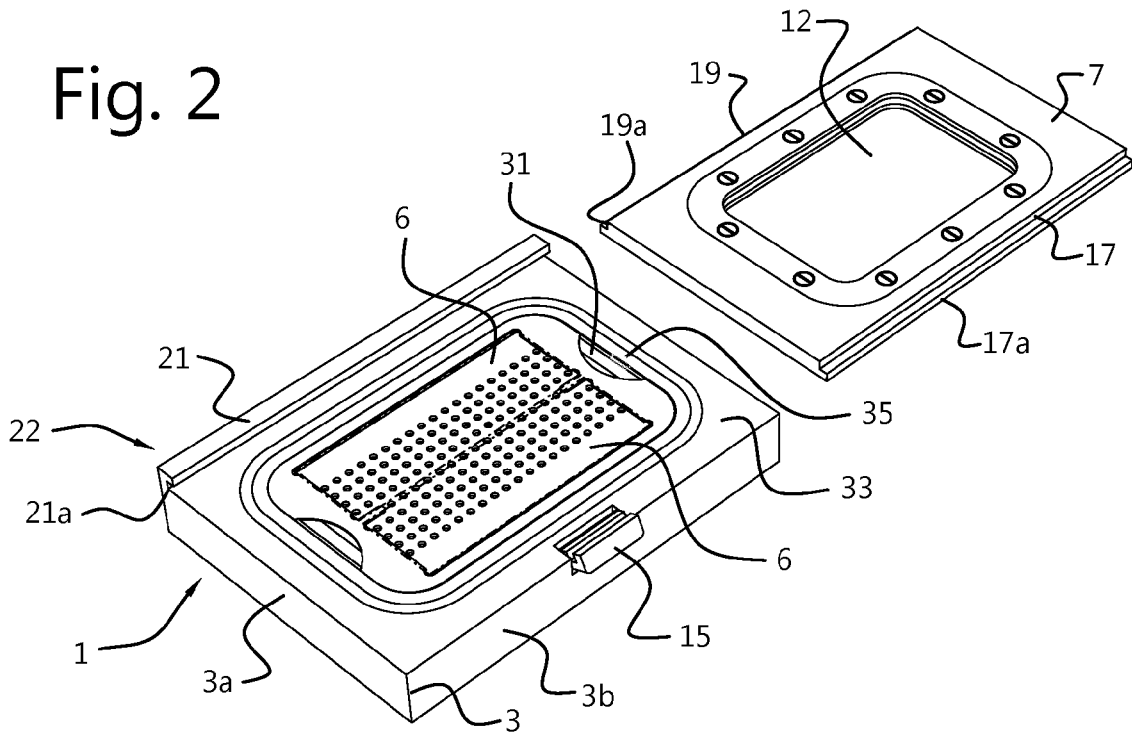


Fig. 3

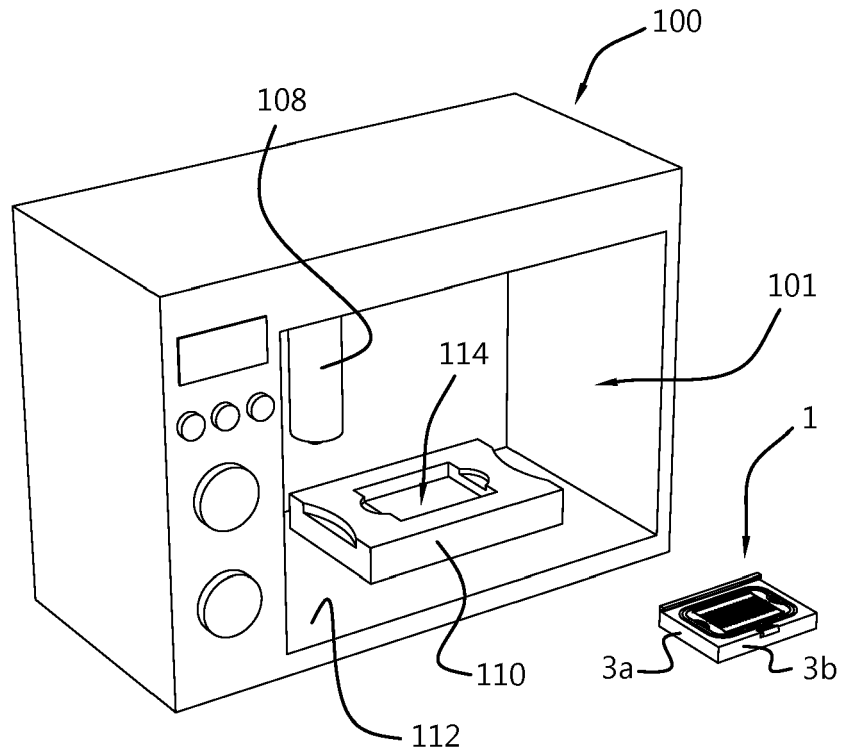


Fig. 4

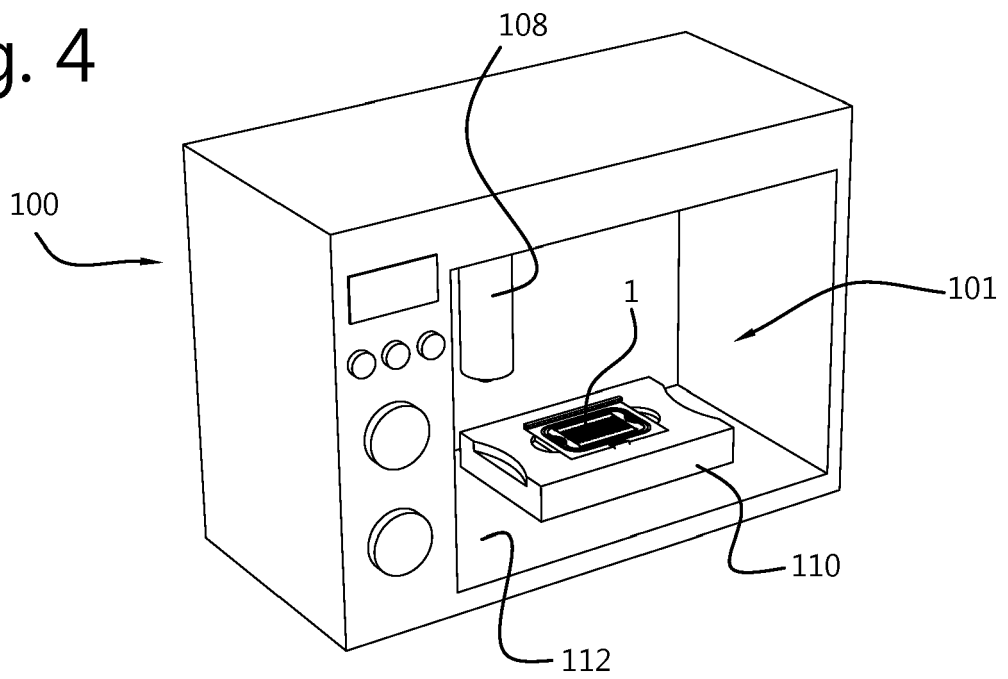


Fig. 5

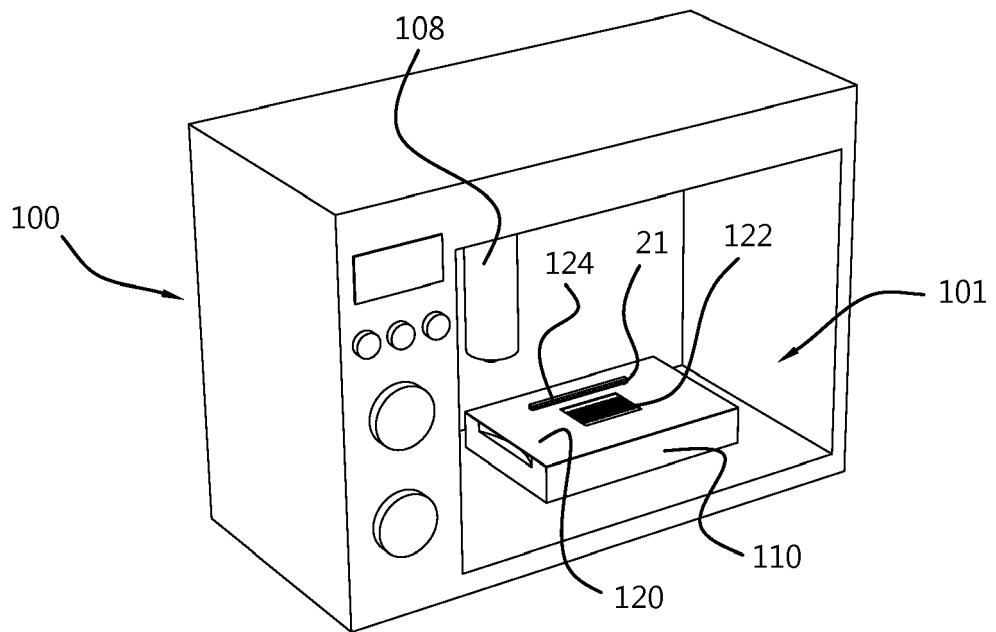


Fig. 6

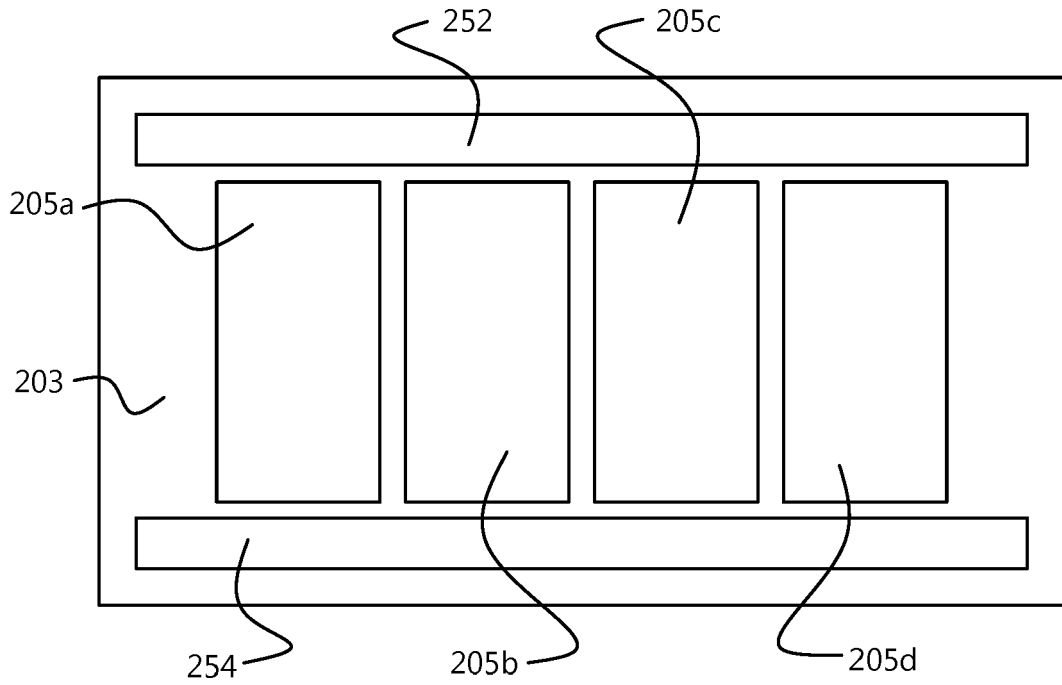
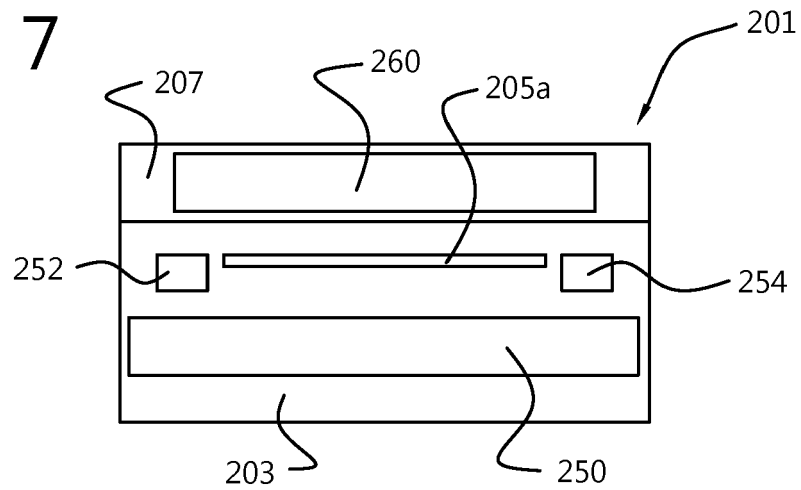


Fig. 7





EUROPEAN SEARCH REPORT

Application Number
EP 18 19 9354

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2016/279640 A1 (IQBAL SHAZI S [US] ET AL) 29 September 2016 (2016-09-29) * paragraphs [0014] - [0019], [0025]; figure 1 *	1-15	INV. B01L9/00
X	WO 2013/106458 A2 (MICRONICS INC [US]) 18 July 2013 (2013-07-18) * pages 39-41; figures 13, 14, 23 *	1,2,7	
X	WO 2016/196210 A2 (ILLUMINA INC [US]) 8 December 2016 (2016-12-08) * paragraphs [0187] - [0195]; figures 27-29 *	1-15	
X	US 2004/086874 A1 (PARKER RUSSELL A [US]) 6 May 2004 (2004-05-06) * paragraphs [0072], [0073]; claims 1,7 *	1,2,7,8,12	
X	US 2007/042340 A1 (KONONEN JUHA [FI] ET AL) 22 February 2007 (2007-02-22) * paragraphs [0045] - [0052]; figures 1,2 *	1-3,12	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B01L
Place of search		Date of completion of the search	Examiner
The Hague		28 November 2018	Viskanic, Martino
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 18 19 9354

5

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016279640 A1	29-09-2016	CN 107820445 A	20-03-2018
		EP 3277428 A1	07-02-2018
		US 2016279640 A1	29-09-2016
		WO 2016154367 A1	29-09-2016

WO 2013106458 A2	18-07-2013	CN 104136123 A	05-11-2014
		EP 2802417 A2	19-11-2014
		JP 6190822 B2	30-08-2017
		JP 2015510111 A	02-04-2015
		KR 20140110925 A	17-09-2014
		WO 2013106458 A2	18-07-2013

WO 2016196210 A2	08-12-2016	AU 2016271049 A1	14-12-2017
		BR 112017025587 A2	07-08-2018
		CA 2987397 A1	08-12-2016
		CN 107847936 A	27-03-2018
		EP 3302804 A2	11-04-2018
		JP 2018518166 A	12-07-2018
		KR 20180011273 A	31-01-2018
		WO 2016196210 A2	08-12-2016

US 2004086874 A1	06-05-2004	NONE	

US 2007042340 A1	22-02-2007	US 2007042340 A1	22-02-2007
		WO 2007024557 A1	01-03-2007

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82