

Microfluidic Vocabulary

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General

Item	Explanation	Source
Biocompatibility	Refers to a special quality of some materials allowing them to come into contact biological materials without changing the materials' bioactivity.	All about fittings, IDEX lifescience, 2013
Biomarker	A biological molecule found in blood, other body fluids, or tissues that is a sign of a normal or abnormal process, or of a condition or disease. A biomarker may be used to see how well the body responds to a treatment for a disease or condition.	NCI Dictionary of Cancer Terms
Centrifugal microfluidics	A sub category of microfluidics utilizing rotation of the cartridge; the fluid flow is mainly controlled by centrifugal-, Euler- and Coriolis- forces.	
Closed System	Systems that use in the cartridge preloaded manufacturer-specific reagents only.	

digital microfluidics	droplets on a surface. Manipulated individual	
droplet microfluidics	droplets in a row in a channel	
Hydrophilic	A tendency of a material to dissolve in water.	SEMI Draft Document 4213
Hydrophobic	A tendency of a material to separate from water.	SEMI Draft Document 4213
lab-on-a-chip	highly integrated, microfluidic system providing laboratory functions ¹ NOTE A lab-on-a-chip is used primarily for analytical purposes.	ISO 10991:2009(E/F): Micro process engineering — Vocabulary
Macroscale	Generally, dimensions of 0.1 millimetres or greater.	SEMI Draft Document 4213
Microfluidic	Fluid transport, physics, and chemistry on microscale dimensions ² .	SEMI Draft Document 4213
Microfluidic subsystem	A “microfluidic subsystem” in a fluidic system may contain one or many MEMS components. The subsystem contains control and signalling elements. The subsystem, in turn, is attached to a larger system or subsequent process, e.g. mass flow controller for fluid delivery, lab-on-a-chip.	SEMI Draft Document 4213
Microfluidics	The science of manipulating and controlling fluids, usually in the range of microliters (10-6) to picolitres (10-12), in networks of channels with dimensions from tens to hundreds of micrometres.	Segen's Medical Dictionary
Microscale	Generally, the scale of dimensions between 0.1 millimetres to 0.1 x 10-6 meters.	SEMI Draft Document 4213
Non-specific binding	If the measurement of specific adsorption	SEMI Draft Document 4213

¹ SEMI Y document: A miniaturised version of a laboratory instrument for performing, typically, a clinical or biochemical analysis.

² Alternative 1): A technology based on geometrically constrained minute volume transport through channels in a glass or plastic chip. The “micro-” in microfluidics refers to small volumes (nL, pL, fL), small size, low energy consumption, or physical effects of the micro domain. 2) handling of fluids in technical apparatus having internal dimensions in the range of micrometers up to a few millimeters. (ISO 10991:2009, 2.5, modified)

	and/or chemical surface binding is the main purpose of the device (e.g. biosensors, electronic “nose”), materials in the fluid handling system leading to the detector must be designed to be compatible with the analytes (def. generically, the item being analysed or quantified). For example, a good design practice is to minimize reactivity and non-specific binding to maximize the fraction of analyte reaching the detector.	
Open System	A system that requires acquisition of all reagents from a variety of other suppliers by the end-user. Such a system needs microfluidic connection(s).	
Wettability	The tendency of a fluid to make contact with a surface.	SEMI Draft Document 4213

Flow

Item	Explanation	Source
Dead-volume	The portion of the internal volume of a system that is not part of a continuous flow-path. In this context dead signifies unmoving, stagnant, or un-swept ³ .	Design Guideline for Microfluidic Side Connect
Internal volume or void volume	Total of dead volume and swept volume	Based on “All about fittings, IDEX lifescience, 2013”
Response time of a system	The time needed for the flow to settle to a different value after changing the control. Expressed as the number of minutes it takes.	
Swept volume	The portion of a volume that is part of the flow path.	Based on “All about fittings, IDEX lifescience, 2013”

Interfacing

Item	Explanation	Source
Additional terms used in microfluidic connections.		SEMI Draft Document 4213
Adhesive connection	Bonding a length of tubing to a port on the microfluidic device with epoxy or other	

³ SEMI DRAFT DOCUMENT 4213 document: Dead volume- a section of tubing, or channel, where fluid flow is stagnant or inefficient.

	suitable adhesive	
Connector	component that allows one part of the set to be connected to another	ISO/IWA 23:2016(en) Interoperability of microfluidic devices — Guidelines for pitch spacing dimensions and initial device classification, 2015
Dynamic seals	Seals that operate with moving surfaces.	SEMI Draft Document 4213
Edge exclusion	Area on the edge of the top or bottom surface that should be excluded from certain features or is reserved for certain features or functions.	Design Guideline for Microfluidic Side Connect
Exclusion area	Area on the chip besides that mating area that is used to create a microfluidic connection	
Ferrule	A metal, polymer or Elastomer ring, tube or cap, (or a multiple arrangement thereof) placed at or fastened to the end of a tube, when pressed against a suitable mating surface with a threaded fitting, or other clamping device, will facilitate a fluid connection. Contact between ferrule and the tube will be with the outside diameter (OD) of the tube. Fluid seal to mating device (chip) will occur at the face of the tube and/or ferrule perpendicular to the tube axis.	
Ferrule connection	A metal or polymer ring, tube or cap, placed at or fastened to the end of a tube	
Flared/ flanged connection	the flattened surface of a tube is pressed against the flat surface of a chip	
Fluidic Adapter	A physical connector that links a microfluidic component to another micro or macroscale fluidic device.	SEMI Draft Document 4213
Free path connection	Introducing liquids into an open port on the microfluidic device with the use of an external delivery system such as a pipette	
Gasket	Mechanical (typically Elastomer) seal compressed between two components to prevent fluid leakage. May or may not grip and seal onto a tube.	Design Guideline for Microfluidic Side Connect

Gasket	A gasket is a mechanical seal that fills the space between two mating surfaces, generally to prevent leakage from or into the joined objects while under compression. Gaskets allow "less-than-perfect" mating surfaces on machine parts where they can fill irregularities. Gaskets are commonly produced by cutting from sheet materials, such as gasket paper, rubber, metal, cork, felt, neoprene, Polytetrafluoroethylene (otherwise known as PTFE) or a plastic polymer (such as polychlorotrifluoroethylene).	
interoperability	characteristic of providing an intended function in coordination with other components, the characteristic of sharing information with other system functions or components to provide additional functionality.	ISO 22902-1:2006, 3.1.42
Macro to Micro Sealing	Sealing that connects the micro regime with the macro regime.	SEMI Draft Document 4213
Macrosealing	sealing on components at the macroscale.	SEMI Draft Document 4213
Macrosealing dimensions	Flow channel cross sections having an effective diameter of >100 micrometres.	SEMI Draft Document 4213
Mating area or mating face	The area on the chip that is covered by the seal or gasket ⁴ .	
Microfluidic connector	An arrangement of components that facilitate exchange of fluidics between devices. A seal and a connector can be one and the same component or a seal can be a separate component. Connectors provide an amount of compression onto the fluidic seals to retain the fluid within the system, or are a vehicle for housing a non-compression seal.	
Microfluidic connector	Instrument to make one or more fluidic connections to a chip, with or without optical or electrical interconnections.	
Microfluidic fanout	A transposer is a primitive design element that allows reconfigurable routing of any fluid from any of n input ports to any n	

⁴ Alternative: Area on the chip needed for the interface

	output ports without interrupting continuous flow.	
Microsealing	Sealing on components at the microscale.	SEMI Draft Document 4213
Microsealing dimensions	Flow channel cross sections having an effective diameter of <25 micrometres; optionally flow channel cross sections having an effective diameter of 25 to 100 micrometres.	SEMI Draft Document 4213
Multi-connector	Connector that houses a set of connections.	Design Guideline for Microfluidic Side Connect
Multi-seal	Seal or gasket that enables a leak-free interface to an array of ports.	Design Guideline for Microfluidic Side Connect
Nipple/Barb connection	Soft wall tubing is stretched over a conical or cylindrical shaped device	
O-ring connection	An elastomer ring of circular cross-section compressed between two components to prevent fluid leakage. May or may not grip and seal onto a tube.	
Pitch	Mean distance between corresponding features in a regular array of features on a surface.	ISO 18115-2:2013, 5.106
Plug and play	Denoting or relating to software or devices that are intended to work perfectly when first used or connected, without reconfiguration or adjustment by the user and thereby enable automatic configuration.	ISO/IEC/IEEE 21451-4:2010, 3.1.31, modified
Port	Access point on a chip for fluidic contacts	
Port Layout	A certain layout in the horizontal plane of a certain type of ports	
Port pitch	The distance between the centres of two adjacent ports.	Design Guideline for Microfluidic Side Connect
Push in connection	Tube is pushed into recess to create interference fit.	
Seal	A seal is normally a sub-system of a connector comprising a component or components arranged at the end of a fluid path and when typically used with a connector will retain fluid within a	Design Guideline for Microfluidic Side Connect

	microfluidics system.	
Side connect width	The length of the side of the chip where the side connector is to be placed.	Design Guideline for Microfluidic Side Connect
Side connection	Connection to the side surface of a device perpendicular to the top surface.	Design Guideline for Microfluidic Side Connect
Static seals	Seals that operate with non-moving surfaces.	SEMI Draft Document 4213
Top connection	Connection to the top or bottom surface of a device on the x-y-plane.	Design Guideline for Microfluidic Side Connect

Modularity

Item	Explanation	Source
Bubble chamber	Part of a bubble trap to give space for the bubble to be trapped.	
Bubble trap	Construction to prevent air gabs or air bubbles to enter a microfluidic object.	
Building block of microfluidic building block (MFBB)	Component that fits with others to form a whole system. In the context of microfluidics, it means a microfluidic component that performs a certain function or set of functions. The building block is a single unit or product that can be assembled onto a fluidic circuit board (FCB) to create a functional system. Often the building block can be used independently. When the main function is a microfluidic operation a building block can also be referred to as microfluidic building block (MFBB)	Design Guideline for Microfluidic Side Connect
Cartridge	A modular unit designed to be inserted into a larger piece of equipment. It integrates by assembly several microfluidic components like pumps, sensors, filters etc.	
Integration	process of physically and functionally combining lower-level functional elements (hardware or software) to obtain a particular functional configuration considered to be of a much higher-level entity.	ISO 10795:2011, 1.117, modified

Fluidic circuit board (FCB)	A fluidic device with microfluidic and or electrical routing and optionally some functionality able to have building blocks (BB) connected to it to form a microfluidic (sub)system.	Design Guideline for Microfluidic Side Connect
micro mixer	micro process component whose primary function is to mix fluid substances	ISO 10991:2009(E/F)
micro process module	micro process component with standardized component interfaces	ISO 10991:2009(E/F): Micro process engineering — Vocabulary
Microfluidic building block (MFBB)	See building block	Design Guideline for Microfluidic Side Connect
Microfluidic chip	A complex set of integrated fluidic components and their interconnections on a planar substrate, created by etching, imprinting, moulding etc. ⁵ .	
Microfluidic chip holder	A reusable microfluidic package.	
Microfluidic packaging	The technology relating to the establishment of fluidic, optical and/or electrical interconnections and appropriate housing for a microfluidic chip. Microfluidic packages provide mechanical protection of the chip and at least interconnection of electrical / optical signals and / or fluids. It can also provide distribution of electrical energy (that is, power) for circuit function, and dissipation of heat generated by circuit function.	
Microreactor	A device in which chemical reactions take place in a confinement with typical lateral dimensions below 1 mm.	Chemical Engineering and Chemical Process Technology - Volume III, 2010
Nipple	A metal or polymer cylindrical or cone shaped device intended to provide an	

⁵ Alternative: A chip containing very tiny channels in which the movement of fluids can be controlled. They allow the integration and miniaturisation of many laboratory processes. Due to the tiny size, only low quantities of chemicals and test materials are required.

	interference with the inside surface of elastomeric tube, facilitating a fluid connection.	
Optical window	An opening constructed in a package that functions to admit optical signal to and from a microfluidic chip in the package.	
Reference point	The zero point in a 2 or 3-dimensional system. Distance values in relation to this point give an absolute value in x-, y- or z-direction.	Design Guideline for Microfluidic Side Connect

Testing

Item	Explanation	Source
Verification	The process of determining that a model, simulation, or federation of models and simulations implementations and their associated data accurately represents the developer's conceptual description and specifications).	Systems Engineering Guide
Validation	Validation is the process of determining the degree to which a simulation model and its associated data are an accurate representation of the real world from the perspective of the intended uses of the model	Systems Engineering Guide
Leak	A path (or paths) in a sealed system that will pass tracer gas when a pressure differential, a concentration differential, or diffusion path exists. There are two leak mechanisms: a mechanical passage and a material through which gas can diffuse or permeate. A leak may have both mechanisms operating in parallel.	SEMI Draft Document 4213
Leakage, inboard	Leakage from outside to inside occurring when the internal pressure is less than the external pressure acting on a component or the concentrations of a given component are different inside and outside generating a non-zero chemical potential. Inboard leakage is typically determined by introducing a tracer gas around the exterior of the piping system or component under	SEMI Draft Document 4213

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